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Editorial Notes

The Work of Parliament

THE short Parliamentary Vacation affords an opportunity to review the work which has been achieved during the first quarter of the present year. Naturally the predominant and most important matters have been those relating to foreign policy, and the serious international situation has overshadowed all other deliberations, even those which relate entirely to domestic affairs. From one angle Air Raid Precautions is an entirely domestic concern, but it is not necessary to stress the connexion which this matter has with events which have taken place abroad. The Government have thought fit to confer upon local authorities wide powers with regard to air raid precautions, and it is satisfactory to know that the interests of public utilities, whose duties in the case of a hostile attack from the air would be hardly less important than those of local authorities, are adequately protected by the provisions of the Air Raid Precautions Act.

The attitude of the Government to air raid precaution work which public utility undertakers may be required to undertake is, however, less satisfactory. There is little doubt that such work is urgently required for the safety of the public, and it undoubtedly should be regarded as a national rather than a local matter, and should certainly not be executed at the expense of the public utility consumer. The cost of adequate national defence is surely a matter which should be defrayed by the general taxpayer and not by the consumer of any particular commodity. The Government have, of course, given some assurance with regard to this matter, but it is quite obvious that some rather more concrete proposals will be necessary if public utility undertakers are to be required to give effect to the costly proposals which have been put forward in certain quarters.

From a domestic point of view there is little doubt that the major Measure before the House of Commons has been the Coal Bill, and this Bill has been bitterly contested in all its stages. Unfortunately, the opposition to the Bill was so divergent in interest that to some extent it cancelled out. Clearly the opposition of the colliery owners was irreconcilable with the opposition of the coal consumer, and therefore the Government never had to deal on one issue with the united forces of those who disliked the Bill.

With regard to the consumers' opposition, the Government and the colliery owners were to a certain extent united in supporting the policy of monopolistic coal-selling; nevertheless it is impossible not to express satisfaction with the modifications which have been made in the interests of the coal-buying public. The one outstanding point is that relating to the powers of the chairmen of the Committees of Investigation, and this point, being essentially judicial or legal in character, is one which can most appropriately be discussed further in the House of Lords.

Another Measure which intimately concerns the Gas Industry is the Hire Purchase Bill. This Bill has received very full consideration on Committee Stage, and at one moment the promoters expressed their agreement with the principle of entire exemption for the hire purchase contracts of public utility undertakers, but at a later stage they took precisely the opposite line and refused to differentiate between such contracts and those made by private traders. These differences should be obvious, because the private trader supplies goods on hire purchase as a principal part of his business and in order to foster the sale of such goods, and to make the largest profit thereon. The public utility undertaker, however, supplies apparatus merely as an ancillary part of his main function and with the intention not to obtain profits from the contract but to foster and encourage the sale of gas or electricity. The changes made in the Bill by the Committee were so drastic that the whole policy represented by the Bill is bound to be considered with the utmost care on Report Stage, when a further opportunity will be given for a close examination of the special position of public utility undertakers.

A small Measure which has not received much attention is that which enables a local authority to prohibit the use by vehicular or other traffic of certain streets in order to enable them to be used as playgrounds for children. It is rather deplorable that it should be necessary for children to play in the street, but this is no doubt preferable to the conditions which unfortunately exist in many areas where children have nowhere to play at all. When the Bill was before the House of Lords the question of the position of public utility undertakings who might find it necessary to enter streets in order to safeguard their services was discussed, and suitable assurances were given that they would be in no wise prejudiced.

Selling Gas

THIS was the title of a Paper by Mr. T. P. Ridley, General Manager to the Newcastle-upon-Tyne and Gateshead Gas Company, presented at the meeting of the North British Association of Gas Managers on April 8 and published in full in last week's "JOURNAL." With such a vast subject, Mr. Ridley is to be complimented on his selection of the vital factors affecting gas sales and on covering a wide field within commendably small compass. The wisdom of Mr. Ridley's sales methods is reflected in the success, in both domestic and industrial spheres, of the undertaking he serves; we know his Paper will be carefully studied, and we hope that action will

be taken on the suggestions he put forward, lines of policy which we have consistently advocated in these columns.

Throughout his Paper Mr. Ridley added emphasis to many points we have made in the "JOURNAL," and he spoke in the light of long and wide experience of the administration of one of the most progressive gas undertakings in Great Britain. He referred first of all to research, mentioning that in one direction alone research on domestic gas appliances has resulted within a comparatively short period in improvements representing an economy to the user which could otherwise have been given only by a reduction in the price of gas of between 1½d. and 2d. a therm. But we need more research and more co-ordination and application of research, and we share Mr. Ridley's doubt as to whether the Gas Industry as a whole is making sufficient use of research work, whether in fact the Industry is fully aware of the vital development work which is taking place. Greater co-operation is undoubtedly required between the various laboratories operating within the Gas Industry; and in this direction the Newcastle Company has given a lead by linking up, on behalf of the undertakings subscribing to the Northern Industrial Centre, with the Gas Light and Coke Company's activities at Watson House on a co-operative basis. The Centre now represents both industrial and domestic appliance work, and for a reasonable fee the Gas Light and Coke Company, with its immense resources, co-operates with the northern district in the development work on appliances, the exchange of data and of information on specific and general research and development policies. Methods of testing are agreed; and the difference between the requirements of the North and of London are quickly ascertained.

Again, this arrangement provides facilities for staff training; and more than ever to-day do we need salesmen who have a thorough knowledge of the commodity they are selling, of what appliances will and will not do, and we need skilled fitters, competent craftsmen to ensure that the improvements made in appliances are not nullified by faulty installation. Salesmen should be encouraged to equip themselves fully for their work, and, said Mr. Ridley, "the way to make education really attractive and successful is to give increased remuneration in respect of the knowledge gained." This precept is put into practice at Newcastle. As certain certificates are obtained the sales staff are given additional annual rates of pay, and—we would stress this—these grants are never taken into account when considering future increases in salary.

Incentive to Gas Usage

THEN one has to consider the influence of capital and operating costs on the progress of gas sales; and unquestionably good costing systems are of the utmost value. Apart from capital expenditure there are many operations of a gas undertaking where money may be spent, if not wastefully, at least unnecessarily. Costing systems fail, we suggest, if they do not yield information quickly. It is, for example, no use discovering at the end of a year that several thousand pounds have been needlessly spent on the works. Sources of loss should be made apparent at the end of a week or a month, so that prompt action may be taken. Market conditions fluctuate rapidly, and plants have to be worked to suit the demands and prices of raw materials and finished products. The best results can only be obtained by the availability at short intervals of accurate costs of processes and material. A further aspect of an efficient costing system is that the knowledge that costs are being investigated continuously tends to encourage economy in all departments.

Whatever the costs of gas supply, the charges for gas to the public can be, and, we maintain, must be, presented in a form which will act as incentive to greater usage. As is widely known, Mr. Ridley has for long been a strong advocate of promotional tariffs for gas, and it was natural that he should devote attention to this highly important matter in his Paper. He gave the results at Newcastle of the compulsory block system of charge—the size of the blocks varying with the number of rooms in the houses and also varying between winter and summer quarters—which was put into operation in 1934. The most important point which emerges is that the consumption per domestic consumer has increased, while previously, as with other undertakings, it had shown a gradual decrease. Mr. Ridley cited the case of two undertakings both of which sold on the flat rate basis, one selling at a lower price than the other. The undertaking with the higher price introduced attractive tariffs, while that with the lower price made no effort in this direction. And the result? The sales in the lower price flat-rate area have shown successive decreases during the last few years, while those in the area where attractive tariffs have been adopted have shown considerable increases. As Mr. Ridley maintains, every practicable step should be taken to have attractive tariffs more widely adopted. This is essential to success. Mr. Ridley is going ahead with the all-gas house on his pricing system—displacing raw coal in a coal-producing area. The consumers in the all-gas houses are well satisfied with the change-over. On a recent survey 80% of these consumers stated that the cost was no more than their previous cost for solid fuel, while all who had found the cost to be more than they had expected expressed the opinion that the increase had been compensated for by other advantages.

Selling the Industrial Load

IT is not so very many years since the words "industrial gas" were regarded by the Industry at large with a feeling akin to awe, and the load as being the rather mysterious perquisite of the very few large and privileged undertakings which happened to be situated in areas where, presumably, they could not help getting it. There were, indeed, six or seven undertakings which had exceptional opportunities, but it did not all at once dawn on the Industry that these favoured few were not having big consumptions thrust upon them, but were winning them by really hard spadework and enthusiasm, coupled, of course, with the necessary resources and with co-operation with the suppliers of equipment in designing and producing plant guaranteed to do the job.

The story of the formation of the Regional Centre Scheme, largely through the enthusiasm of these pioneers, is now a matter of history. Its effect has been to bring within the reach of all not only the experience and knowledge of those who have the exceptional opportunities, but also every development which results from the work of the constantly increasing band of suppliers of industrial gas. For the attention which has been devoted to this load in recent years has revealed that practically every gas undertaking in the land, however purely residential it may appear on the surface, possesses some outlet or other in commercial or industrial spheres.

While we rejoice to find that more and more undertakings are adopting this attitude and viewing with enthusiasm the

possibilities of increased outputs, we feel that a word of warning is necessary, especially, though not exclusively, to the newcomers. It is that the load is the thing, and the sale and fitting of the apparatus and equipment is only, from the gas undertaking's point of view, a means to an end. For the appliance maker it is quite another matter. If we are to progress in the way we have gone in recent years, it is essential to bear this aspect in mind. Those to whom we have referred as pioneers, upon whose building the present industrial gas structure so largely depends, never fail to speak in the most enthusiastic terms of the part which the equipment makers have played, and the keen manner in which they have co-operated with those who have offered them co-operation. They can be of tremendous assistance in the further development of the load in general; their knowledge and experience will frequently, if freely accepted, obtain business which the individual gas undertaking might miss. But we must certainly not lose sight of the fact that they are makers, suppliers, and fitters of industrial equipment, and not necessarily of *gas* equipment. If they get a raw deal from the Gas Industry, or from any unit of it, can we wonder if their interest turns to solid fuel, to oil, or to electricity?

We do urge, therefore, that co-operation with such a valuable potential ally be whole-hearted. Let us work together with the one object of satisfying the consumer and obtaining for ourselves the gas load, and for the equipment makers whatever may reasonably be considered their due. We must surely go more than half-way to meet them, and do everything possible to help them to place gas consuming appliances wherever they can do a good job of work and bring revenue to the Gas Industry. Nothing could be more short-sighted than to regard them—and treat them—as trespassers on our preserves. Unfortunately such an attitude is not altogether unknown.

Personal

Mr. THOMAS MCDOUGALL, Assistant Manager to the Galashiels Gas Light Company, has been appointed Manager to the Linlithgow Gas Light Company. He had been at Galashiels for the past eleven years.

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The announcement in our issue of April 6 of the retirement of Mr. F. L. NICHOLS has, we learn, led to some confusion. Messrs. William Sugg & Co., Ltd., ask us to point out that Mr. E. W. Nichol continues to represent them in the South of England, as he has done for many years past.

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Fifty-two years with the Nottingham Gas Department is the proud record of Mr. THOMAS E. WRAGG, who retired on April 14. Mr. Wragg commenced work as a junior clerk when only twelve years of age and served under five Engineers and Managers and three Distribution Superintendents. Mr. George Dixon, B.Eng., A.M.I.C.E., Engineer and Manager, made a presentation on behalf of the workmen and staff. Mr. Wragg was Senior Clerk at the Woodborough Road Depôt at the time of his retirement.

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Mr. E. BATES, who has been Technical Assistant of the Stalybridge Corporation Gas Department for several years, was presented with a beautiful fountain pen and pencil in casket, by the officials and staff, on April 5, as a token of their esteem on his leaving to take up a position as Industrial Representative under the Manchester Corporation Gas Department, reference to which appointment has already been made in these columns. Mr. R. J. Restall, Engineer and Manager, presided, and with him were Councillor H. Riley, Deputy Chairman of the Gas-Works Committee, Councillors N. Carr, H. Hudson, and J. Tetlow, and Mr. J. Byrom, Assistant Engineer and Manager.

* * *

Three Junior Assistants articled to the Cardiff Gas Light and Coke Company, and qualified for admission to The Institution of Gas Engineers by passing the Higher Grade Examination, have received appointments in the Gas Industry during the past month. They are Mr. R. E. P. HOSKIN, who has joined the engineering staff of the Oxford and District Gas Company; Mr. F. D. THOMAS, who has been appointed Resident Assistant Engineer to the Merthyr Tydfil Gas Company; and Mr. H. E. TAYLOR, who becomes Assistant Engineer at the works of the Rossendale Union Gas Company, a subsidiary of the United Kingdom Gas Corporation.

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The Staff of the Barnstaple Gas Company recently presented Mr. F. L. SCHOFIELD, whose retirement from the position of Managing Director and Secretary of the Barnstaple Gas Company has already been announced in these columns, with an easy chair. Mr. H. W. Yeo, in making the presentation, testified to the esteem in which Mr. Schofield was held, and wished him many years of happiness in his well-earned rest. He had given a lifetime's work to the building up of a concern of which they could be justly proud, and he left them with a deep sense of indebtedness for his help, guidance, and kindly control all through his 39 years' managership. The Staff were losing a valued counsellor and friend. Mr. Schofield, expressing his thanks for the gift, recalled the wonderful spirit of co-operation which he had experienced in whatever activities he had been engaged on for the Company.

Obituary

The death has taken place of Mr. JOHN MUIR, who for many years was Secretary and Collector of the Bonnyrigg Gas Light Company.

Southern Association Activities

The Summer Meeting of the Southern Association of Gas Engineers and Managers will be held on Friday, June 24, at Lea Bridge under the Presidency of Mr. D. C. Cross. Members and their ladies will be entertained at luncheon on the kind invitation of the Chairman and Directors of the Lea Bridge District Gas Company and will afterwards visit Hatfield House.

The County Meeting of the Eastern District will be held at Croydon on Thursday, June 30. Members will be entertained at luncheon on the kind invitation of the Chairman and Directors of the Croydon Gas Company.

Junior Gas Associations

Award of Silver Medals

The Council of the Society of British Gas Industries have again this year awarded Silver Medals to each of the Junior Gas Associations for the adjudged best Paper presented during the year by their members at a General Meeting. In all, 22 Papers were submitted from 7 Associations for adjudication. They were of a very creditable standard.

The following is a list of the Awards:

London and Southern District Junior Gas Association.

F. O. HAWES .. .. Feb. 12, 1937.
"The Effects of Changes in Composition upon the Combustion of Town Gas."

Midland Junior Gas Association.

F. J. BENGOUGH .. .. Oct. 21, 1937.
"The Purging of Water Sealed Gasholders."

Wales and Monmouthshire Junior Gas Association.

H. V. WILLIAMS .. .. March 20, 1937.
"Mains and Services."

Western Junior Gas Association.

K. G. BODILEY.. .. .. March 20, 1937.
"Some Modern Methods of Street Lighting."

Manchester and District Junior Gas Association.

A. E. HARDMAN .. .. May 5, 1937.
"Steaming in Horizontal Retorts."

Yorkshire Junior Gas Association.

A. E. WILSON .. .. Jan. 16, 1937.
"My Last Twelve Months with Industrial Gas."

Scottish Junior Gas Association (Western District).

W. M. GLEDHILL .. .. Jan. 9, 1937.
"The Development of a Gas Amalgamation."

News of the Week

Property Has Been Acquired by the Motherwell and Wishaw Town Council in Windmillhill Street, Motherwell, for use as gas showrooms.

The Scottish Junior Gas Association (Western District) have been granted facilities for a preview of the Gas Pavilion at the Empire Exhibition at Glasgow on Thursday, April 21, at 6.45 p.m.

An Order from the War Department for 47 gas storage water heaters for the R.A. Barracks at Woolwich has been received by the South Metropolitan Gas Company, according to a note in the current issue of the Company's *Co-Partnership Journal*.

Applications for the Position of Secretary to the Yorkshire Industrial Gas Development Centre are invited in our advertisement columns. The position, it is stated, should be attractive to a progressive junior wishing to gain experience, and carries a commencing salary of £300 per annum.

The Golden Jubilee of the Bentham Gas Company as a limited company has recently been celebrated. Prior to April 10, 1888, the Bentham Gas-Works were owned by Mr. Jeremiah Whiteley, and when the Company took it over there were only 42 consumers; to-day that figure has risen to 450.

Fire Broke Out early on Thursday at the Whiston Works of Stoves, Ltd., Warrington, and caused damage estimated at thousands of pounds. Six hundred workers have been thrown out of employment temporarily, and production has been stopped. Directors of the firm were on the scene soon after the alarm had been given, and workmen and police assisted the Whiston Fire Brigade in fighting the blaze. The departments destroyed included three offices, the assembling shop, dispatch department, and stores.

As Foreshadowed by the Chairman in his speech at last year's General Meeting, Messrs. Falk, Stadelmann, & Co., Ltd., have introduced, through the Prudential Assurance Company, Ltd., a Life Assurance and Pension Scheme, applicable to the Staff of the office and warehouse of the parent Company and its Subsidiaries.

Mining Subsidence at Alloa has been responsible for damage to gas pipes, and representations have been made for enquiry at the instance of the Gas Committee of Alloa Town Council in order to learn the position in regard to liability for this damage. The report states that while the cost of repairs at Clackmannan Road was small, it might be necessary to relay in the future six or seven hundred yards of new piping at a cost of £250. The loss of gas in this section had been very considerable. In regard to the Fishcross-Alva supply pipe, a large number of joints had been drawn on the new pipe, which had been laid twelve months ago, resulting in a considerable leakage of gas.

Mr. R. N. LeFevre, Officer-in-Charge-of-Training, the Gas Light and Coke Company, speaking at the National Safety First Association's Industrial Safety Conference at New College, Oxford, on April 8, 9, and 10, said that he was a firm believer in the value of visual demonstration in all forms of training, irrespective of audience. With boys in particular, said Mr. LeFevre, more could be achieved by actual demonstration than by hours of lectures and note taking. In gas fitting practice there were a few very serious hazards which most uninitiated persons would not believe could happen unless they had actually witnessed them. Considerable importance was attached to a series of carefully staged demonstrations of "accidents" which each apprentice and trainee had to witness.

Cumberland Coal

The issue last week by the Department of Scientific and Industrial Research of a report* on the Little Main Seam of Cumberland marks a further advance in the work of the Physical and Chemical Survey of the National Coal Resources and adds a new field to those already covered by the Fuel Research Survey Papers.

The work in Cumberland is carried on from the laboratory in Newcastle-on-Tyne. The Little Main seam was selected as the first for examination as being the most constant and regular in the Cumberland coalfield.

The methods of analysis used were those of the British Standards Institution and the results are therefore strictly comparable with other results of the survey in other fields. Full data are given for each sample, and particular attention is paid to phosphorus content, an important constituent in this steel producing area.

The analytical results are tabulated and discussed in a summary at the end of the report, which concludes with these words: "In general, the Little Main seam yields a reasonably clean coal which is exceptionally low in sulphur, but rather high in phosphorus. The coal has a carbon content of approximately 86% and fairly strong caking properties, so that it is suitable for use either as a coking coal, for gas manufacture, or for general purposes."

* Fuel Research Survey Paper No. 42—The Little Main Seam. Published by H.M. Stationery Office; price, 2s. net.

Gas at the Scottish Empire Exhibition

It is anticipated that visitors to the Gas Pavilion will exceed 5,000 per day. Arrangements have been made for organized parties to bring their visitors to the Gas Pavilion for tea, and the co-operation is being obtained of the Milk Marketing Board, Tea Marketing Board, Potato Marketing Board, and the Herring Fisheries Board.

Cookery demonstrations will be given twice daily, while mannequin parades by the leading stores in Glasgow and district will be held each week.

A competition covering the whole of Scotland has been arranged with the leading Scottish cinemas, and in conjunction with the education authorities a special booklet is being issued to schoolchildren.

Mr. J. W. Napier, of Alloa, has loaned the Bronze Medallion of William Murdoch for exhibition in the Gas Pavilion.

Women's Gas Council

New Branch at Swindon.

The Inaugural Meeting of the Swindon Branch was held on Friday, April 8. Mr. Cecil H. Chester was in the Chair supported by the Mayoress of Swindon, who consented to become President of the Branch.

Miss Halpin, Organizing Secretary, spoke on the work of the Women's Gas Council, and it was proposed from the meeting that a branch be started in Swindon. After the meeting tea was served and 35 members enrolled.

Ideal Home Exhibition.

A party of 450 members of the Women's Gas Council from Bexleyheath, Biggleswade, Brixton, Hertford, Hitchin, Poplar, Shefford, Southend, Tottenham, and Worthing visited the Ideal Home Exhibition on Monday, April 11, and were entertained at tea.

Athletic and Social

Dover Co-Partners' Annual Supper.

Speaking at the Annual Supper of the Dover Gas Company Co-partnership Scheme on April 11, Mr. G. le B. Diamond, General Manager, said that co-partnership had been in operation for nine years. There were 100 co-partners and on Dec. 31 the amount standing to their credit was £11,361. Bonus allotted for the year was £1,225, and £1,240 had been transferred. The wages and salaries of co-partners in the Dover Gas Company came to £16,532. Pension allocation for the year was 7½% of wages and salaries.

He protested at the fact that they still had to pay coal dues in Dover, which meant that they had to spend £1,960.

Mr. C. W. Chitty, President of the Dover Chamber of Commerce, paid a tribute to the efficient manner in which the Company was run. He said that co-partnership was an excellent thing as it brought about a better feeling between employers and employed.

Among those present were Mr. E. M. Worsfold, who presided, Mr. R. G. A. Clark, Resident Engineer and Manager, Alderman G. Norman, Dr. Hinchcliff, Mr. E. Bradley, Mr. H. Jacques, Principal of the Dover Technical Institute, Mr. W. Paramor, Mr. J. F. Tyndall, Engineer and Manager, Deal and Walmer Gas Company, Mr. H. A. Probin, Mr. J. Fish, and Mr. W. R. Moffat. The Mayor of Dover (Councillor J. R. Cairns) was present later in the evening.

Anthracite Blends

In a Joint Paper presented to the South Wales Institute of Engineers Mr. Ivor J. Lane and Professor J. W. Cobb described experiments on blends of a Welsh anthracite and a highly caking bituminous coal from the Black Vein Seam (Monmouthshire).

What emerges from the results of the experiments, the Authors stated, is a clear demonstration that the properties of the blend carbonized at 800° C. are very far from being an average of those of its constituents carbonized separately at the same temperature and that it will presumably be possible by study and experiment to confer upon a blend, suitably chosen and treated, properties which its constituents separately do not possess, or to retain some desirable property while modifying another which is less desirable. The carbonized blend of 50% anthracite and 50% bituminous coal had the same apparent density as carbonized anthracite (1·59), much above that of raw anthracite (1·4), carbonized bituminous coal (1·4), or raw coal (1·28), but it had also the properties of a lower ignition point and a higher reactivity than those of either the anthracite or bituminous coal carbonized separately, which would make for liveliness in use. This combination of liveliness and high density may be a valuable property. The carbonized 50/50 blend was also mechanically the strongest coke obtained, with a finely porous uniform structure. With larger proportions of anthracite, the coke weakened, until with 80% anthracite it was only feebly coherent.

The blending experiments are only to be taken as illustrative of what may be possible, since in them the carbonization was carried out at one medium temperature only (800° C.) with a particular anthracite and bituminous coal. Moreover, each coal was powdered, whereas some alteration in properties would arise from the use of one or both constituents in coarser grains. The results are, however, highly suggestive of the alteration and control of properties in carbonized fuel which may be acquired from blending and justify further systematic experiments, not only on anthracite and bituminous coal, which were deliberately chosen as extremes, but on coals of intermediate composition and characteristics, exemplified by the steam coals. The chemical and physical factors operating at different temperatures in determining the final properties of the carbonized blends are too numerous and interdependent to allow any confident prediction of results without actual trial. Useful guidance will, however, be forthcoming and the value of the experiments increased if specific properties capable of measurement and numerical expression are studied and the results recorded. Useful work on the blending of Welsh coals has already been done, and the names of Roberts, the Powell Duffryn Company, and Messrs. Coppée may be mentioned in this connexion.

Anthracite has its own well-known excellences as smokeless fuel, but it was interesting to ascertain whether it could be made more reactive. The results of experiments indicate clearly that even a small proportion of Na_2CO_3 (0·5%) had a remarkable effect, multiplying the reactivity six times, while larger additions of sodium carbonate caused a further increase in reactivity. The results were obtained whether the anthracite had been carbonized previously or not. Anthracite so treated would presumably gasify more rapidly in a producer and burn with more flame in an open fire or stove while retaining its excellent property of working with freedom from tar in the producer, or smoke in the fire. Larger scale trials on these points are justified, although it is desirable to recognize at the outset that the presence of the alkali introduces obvious possibilities of complication from its interaction with ash and refractory linings, and its formation of flying corrosive dust.

It is claimed, however, by T. S. Swallow ("GAS JOURNAL," Nov. 11, 1936) that in experiments made for Imperial Chemical Industries with sodium carbonate and lime as an addition to coal in a gas-producer, the attack on the refractory brick lining was not commercially serious. Moreover, the tendency of modern design in gas producers and water gas generators is to minimize the amount of brickwork used in the high-temperature parts. The use of lime along with soda makes it possible to obtain the same enhancement of reactivity with a smaller addition of soda, as stressed by Askey.

A Cooker Fortnight Display

This striking window display was used by the North Middlesex Gas Company in support of the recent National Cooker Fortnight. It was also decided to run one month's cookery demonstrations from Feb. 21 to March 18, which were backed by newspaper advertising and posters, while a programme and invitation were sent to every consumer. These demonstrations were a great success, and were attended by approximately 1,500 consumers. A novel attraction, consisting of a twenty-minute talk on dietetics immediately preceding the demonstration, was included in the programme. Also 50% of the first instalment was allowed off all orders for cookers placed within this period, which had the effect of increasing the average weekly sales by 75% during this time.

Forthcoming Engagements

April.

22.—**B.C.G.A.**—Joint Conference Northern and Yorkshire Districts at Scarborough.

23.—**Western Juniors.**—Annual Meeting at Swindon. Presidential Address by J. E. Akroyd.

23.—**Midland Juniors.**—Visit to Central Laboratories and Automatic Water Gas Plant, Nechells Gas-Works, Birmingham.

23.—**Wales and Monmouthshire Juniors.**—Annual General Meeting at Newport, 3.30 p.m.

23.—**Yorkshire Juniors.**—Meeting at Leeds. Paper by G. F. Murray, of Sheffield, on "Water Heating by Gas."

25.—**I.G.E.**—Research Executive Committee, 11.30 a.m.

26.—**I.G.E.**—Gas Education Executive Committee, 11 a.m.; Gas Education Committee, 2.30 p.m.

27.—**Southern Association (Eastern District).**—Meeting at Gas Industry House. Discussion on "Aeration Test Burner Number Control of Town Gas," 2.30 p.m.

27.—**W.G.C.**—Annual General Meeting, Gas Industry House, 3 p.m.

28.—**Federation of Gas Employers and National Gas Council in Scotland.**—Annual Meetings, Central Station Hotel, Glasgow, at 11.30 a.m. and 2.30 p.m., respectively.

28.—**Southern Association (Western District).**—Commercial Meeting, Rougemont Hotel, Exeter, 2.30 p.m.

30.—**London and Southern Juniors.**—Visit to Beckton Gas-Works of the Gas Light and Coke Company.

There will be no meeting of the Central Executive Board of the N.G.C. or of the Central Committee of the Federation of Gas Employers in April.

May

2.—**I.G.E.**—Research Executive Committee, 2.30 p.m.

3.—**I.G.E.**—Finance Committee, 9.30 a.m.: Membership Committee, 10 a.m.; General Purposes Committee, 11 a.m.; Council, 2.30 p.m.

3.—**London and Southern Juniors.**—Annual Business Meeting.

5.—**B.C.G.A.**—Manchester District Conference at Warrington.

5.—**Midland Juniors.**—Annual General Meeting. Address by R. J. Rogers.

6.—**North of England Association.**—Annual Meeting at Newcastle-upon-Tyne.

A FEW IMPRESSIONS OF
The Ideal Home Exhibition

Progress is ever the keynote of the "Daily Mail" Ideal Home Exhibition, which continues at Olympia until the end of this month, and progress is seen in many forms, not least of which is that evidenced by a number of splendid displays of gas appliances in the heating and lighting section. Through the good offices of the Gas Light and Coke Company and many leading appliance manufacturers, this 22nd Ideal Home Exhibition puts the full story of modern gas service across in a most convincing manner.

It is impossible to deal by any means fully with the excellent displays of the gas exhibitors, but an endeavour has been made in the following pages to give an impression—pictorial and otherwise—of the various stands and "side shows," with special reference to novel exhibits which demonstrate the domestic applications of gas in their most up-to-date form.

It goes without saying that the stand of Ascot Gas Water Heaters, Ltd., is of original conception. Particular emphasis is laid upon the firm's new boiling water heater to which end the section of the stand takes the form of a café where tea, made from these heaters, is served by several attractive young ladies. Among the latter are Lotus Fragrance, Miska, and Vavah, who appear in the accompanying photograph. This is what the firm say about them. Miss Fragrance is a star in "Incident in Shanghai," the daughter of a Chinese judge who was shot; and her name in her own land is Ho Hing. Miska, who has also been in films, really wants success as a designer and cutter. She tells of tea-houses where company gather for long evenings for tea-drinking and chatter, and she describes the manner in which the tea is made in Russia. The water is boiled in a samovar with glowing charcoal, and the tea is made in a small pot heated on top of it; a little of the very strong tea is poured in a glass, and then diluted with boiling water, contrasting oddly with the speedy efficiency of the modern "Ascot" boiling water appliance.

Vavah Raya wears a pale blue lace-edged sari draped enchantingly over her glossy black hair. Her Indian way with tea is much like ours, except that she uses tea with no tannin in it.

After being refreshed by such a charming trio, visitors will be interested to examine the "Ascot" exhibits, which, in addition to the boiling water appliance for tea-making, include sink water heaters, bath heaters, and multi-point heaters, all designed to harmonize with the modern home and to meet the 101 needs of the modern housewife for instant hot water. An interesting exhibit is a model showing how the "Ascot" multi-point heater may be coupled up to an existing solid-fuel boiler system. Arrangements have been made in the Olympia Television Programme for televising "Miss Christine Veasey and the 'Ascot' Girls."

It is interesting to note that out of the total of ten show houses at the Ideal Home Exhibition this year nine are equipped with gas and nine with "Ascot" gas water heaters. The Bride's House also has an "Ascot" multi-point heater installed and a special glass "Ascot" is an outstanding exhibit in the Glass House.

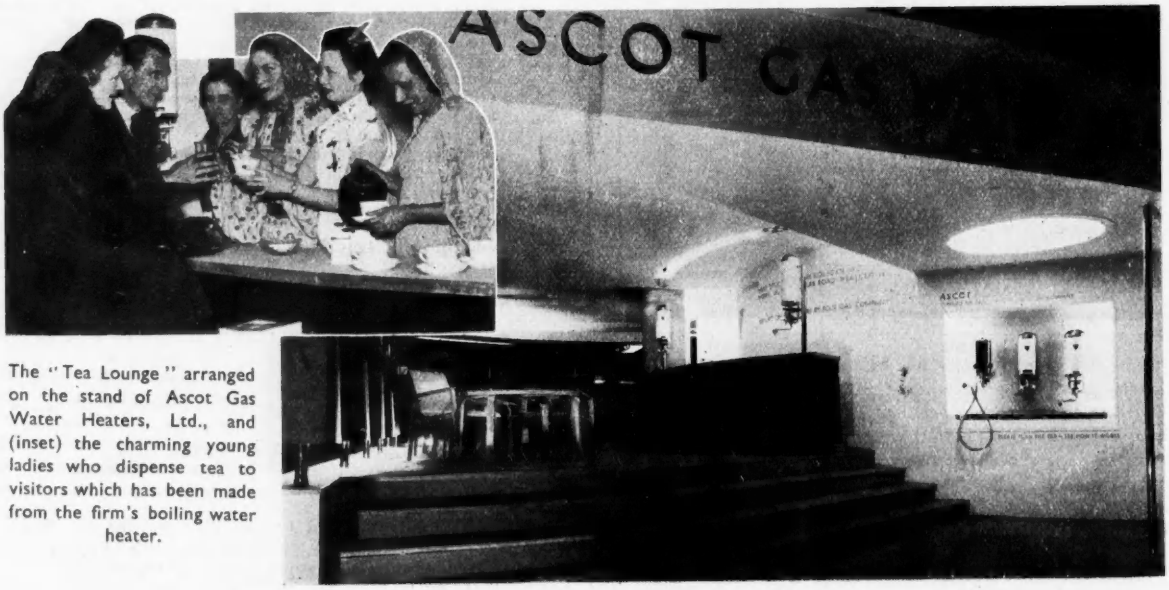
An Interesting Washing Machine.

An interesting electrically-driven gas-heated washing machine is demonstrated on the stand of Barker & Turner, Ltd. Among the features of the "Bar-Spot" is that the agitation of the clothes is effected by the movement of the whole tank and not by any internal agitator which is sometimes liable to entangle with and tear the clothes as well as providing a possible source of leakage from the tank. The capacity of the tank is 14 gallons, and the machine is complete with a serviceable wringer which drains into the cupped lid of the machine when folded back. The same lid provides a useful table top, encasing the whole top of the appliance, when not in use. Both tank and lid are easily emptied by means of a syphon device. A smaller model marketed by the firm is heated by gas but is manually agitated.

"Portcullis" Heaters.

Once again Bratt Colbran, Ltd., manufacturers of the "Portcullis" series of gas appliances are exhibiting a full range of their productions. Outstanding among the many interesting features on display is the flueless "Brent" background heater, which provides localized central heating in rooms, at a very low installation and running costs. In addition, gas fires are shown in appropriate settings of wood, marble, and tiles, each displaying a combination of design and colour worthy of note.

A fire which is attracting a good deal of attention in the Industry is the latest development by Bratt Colbran, Ltd.—the "Lancelot"—which embodies a number of noteworthy features. In appearance it has in every way the architectural lines of all Bratt Colbran cast fires but has been produced in stamped steel



The "Tea Lounge" arranged on the stand of Ascot Gas Water Heaters, Ltd., and (inset) the charming young ladies who dispense tea to visitors which has been made from the firm's boiling water heater.

to meet the Industry's demand for a fire possessing the features of both lightness and durability, at a price that is well within reach of the public purse.

As opposed to the normal 30 cu.ft. per hour rating of a 3-unit "Portcullis" fire, this fire is rated at 40 cu.ft. per hour (C.V. 500) full on, but has incorporated a device permitting the graduated reduction of gas rate. This device is controlled by the tap which can be set to three intermediate positions, identified by audible "clicks."

There is practically no diminution of luminosity of the radiants when the tap is turned down to the third "click"—the radiants remaining luminous to the top, thus eliminating the uninteresting and chilling appearance when the tap is turned down.

A Comprehensive Water Heating Display.

A comprehensive gas water heating exhibit is that of Ewart & Son, Ltd. A working demonstration is given of the firm's new "Empire" multi-point water heater. This is stated to be a non-condensing appliance of a capacity of 3½ gallons per minute raised 40° F. It is fitted with a safety cut-out, constant gas governor, and—a useful adjunct not found in many, if any, other models—an automatic lighter operated on the flint principle. It is also fitted with water temperature control.

Examples of single-point and sink water heaters are also shown on this stand—all in pleasing white porcelain enamel finish—while an interesting little heater for the bathroom is one which embodies a shaving mirror on the rectangular outer casing. By reason of the warmth from the body of the heater this mirror is not susceptible to steaming which is so irritating to the shaver.

New "Streamlined" Cooker.

Sidney Flavel & Co., Ltd., are concentrating this year on one model of their range of cookers—namely, the new Flavel "37." This is a "streamlined" gas cooker, constructed throughout in moulded pressed steel, smooth in outline, and immaculate in white porcelain enamel, relieved in black. Incorporated in the cover top is a full-sized plate-rack; one movement only is needed to put the plate-rack into position. When not required, it is only necessary to lift the plate-rack slightly, and the top can be closed down in one movement. In addition to three boiling burners the hotplate is fitted with the Flavel patent high-speed double grill which toasts or grills in a very short time. The oven is spacious and is fitted with two grid shelves and a baking tray. The cooking in the oven is automatically controlled, and the two side burners are sunk below the level of the base plate of the oven, thereby enhancing the neatness of the oven interior and enabling the use, if need be, of the base plate itself for cooking purposes.

Another useful feature of this cooker is that the hotplate and enclosed grilling chamber projects some 4 in. back from the level of the back of the oven, thus providing space behind the cooker for cleaning purposes. The supply pipe is concealed, and the whole cooker is neat and attractive in appearance.

"Boiler Bothers Abolished."

With "Ideal" gas-fired domestic boilers no effort is involved in securing a constant supply of hot water; they are entirely automatic. As soon as the required water temperature has been reached the gas supply is shut down to a self-pilot flame at each burner. These small pilot flames remain until hot water is drawn off or the temperature falls through loss of heat from the pipes, when they are returned to the "full-on" condition by the action of the thermostat. A gas governor ensures the gas supply being at the correct pressure for efficient operation. Ample clean-outs are provided for the periodical removal of lime deposit, and for soft water districts the boiler can be supplied rustless. "Ideal" domestic boilers are attractively finished in grey mottled and grey vitreous enamel.

There are also "Ideal" boilers for meeting large-scale demands—for example, the No. 2 and 3 Series. The first of these is available with from ten to fourteen sections and ratings varying from 198,000 to 297,000 B.Th.U. per hour. The second is made in sizes ranging from five to thirteen sections and ratings from 390,000 to 1,430,000 B.Th.U. per hour. Both these types are very attractively finished. The firm's No. 1 and 2 Series are designed for heating and indirect hot water supply and No. 3 for water and steam heating and indirect hot water supply.

These and ancillary equipment for water supply, including examples of their radiators in pleasing coloured finishes, contribute towards an interesting exhibit.

The New Gas Refrigerator.

The new gas refrigerator is demonstrated on the stand of Kula Refrigerators, Ltd. This refrigerator, which was described in the "JOURNAL" for March 30, is the result of research carried out over a number of years. At present only one model is being marketed, having a capacity of 3 cu.ft. The exterior is finished in durable white enamel with chromium-plated hinges, lock, and regulator. There are four ice trays and shelves. With the regulator set at maximum the gas rate is 3 cu.ft. per hour, cutting down to ¼ cu.ft. per hour on thermostatic control. The principle of operation is, of course, constant absorption. The unit is robustly constructed and covered by the firm's patents.

As is to be expected the "Kula" possesses all the advantages of gas-operated refrigeration, among which we might mention absolute silence in operation, no moving parts to wear out, economy, and elimination of radio interference.

Mr. Therm's Domestic Help Agency.

The Gas Light and Coke Company have, as usual, a fine comprehensive exhibit, demonstrating in a practical way all the latest domestic application of gas. The main part of the stand is arranged to tell a hot water story—the scene being "Mr. Therm's Domestic Help Agency." The actors are a demonstrator, who does lightning sketch work on a blackboard and explains the functions of her four "Domestic Helps," which are life-size walking models of gas water heaters. The demonstrator recommends each "help" for a particular job, and the whole idea is attracting a great deal of public attention.

Mr. Therm's News Theatre in the gallery is also a popular feature. The Theatre seats 500 people, and continuous programmes of gas and other films are being shown.

The British Gas Federation is represented by an Information Bureau for the Gas Section, where visitors' queries can be answered. Tickets are available here for the films shown in "Mr. Therm's New Theatre."

A Colourful Display.

A particularly colourful display is that of R. & A. Main, Ltd., who are conducting periodical cookery demonstrations on their stand. Their "cinema" cooker is another novel feature. This cooker, which stands in a recess at eye level, looks perfectly normal save for a rather unusual door front; this is explained by the fact that it is really a little cinema screen on to which films are projected from behind. These include topical films and "shots" from Main's works.

An attractive range of this firm's well-known appliances is displayed, including their new "Fire King" gas fire, which is of very pleasing design. Their range of "Sussex" cookers needs no further mention in these columns, save to say that the coloured finishes make them a worthy adjunct to any kitchen. The "P.R." hotcloset is also shown, this being capable of attachment to the cooker in the place of the usual plate-rack or independently to the wall. Various types of water heaters are appropriately set out to demonstrate their different applications, while a newcomer to the firm's range of portable fires is the "Glowmain"—a pleasing little model with the effect of a glowing bar set in stainless steel frame. Other fires and radiators in attractive finishes complete an exhibit which covers every phase of domestic gas utilization.

"Renown" Cooker Exhibit.

The outstanding exhibit on the stand of the Parkinson Stove Company, Ltd., is the "Renown" cooker, which is shown in two sizes—the Mark I. and Mark II. The cooker is effectively demonstrated on a revolving platform, showing the simple operation of the table top and the drop pattern doors of the oven and grilling chamber. The smooth, white-enamelled exterior, entirely enclosing all supply pipes, and the other noteworthy features of this cooker are too well-known to need reiteration here. The display is complete with a selection of other Parkinson appliances, including portable and panel type fires and instantaneous gas water heaters for kitchen and bathroom requirements.

Automatic Central Heating.

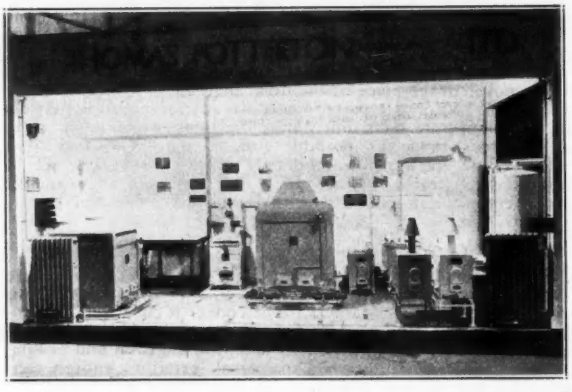
More than thirty years ago, when gas water heating was in its infancy, Mr. Thomas Potterton, in the course of research extending over several years, devised a hand-operated cut-out valve for

use with gas water heating systems. This device, as its name implies, was a simple contrivance applied to the storage vessel for the purpose of reducing the quantity of water in circulation, whereby a small volume was heated for culinary and hand-basin purposes when baths are not required. A development of this was the night-valve system, also worked by hand, which was designed to shut off the secondary circulation at night, thereby maintaining the hot water till the morning with little heat loss. Such devices are, of course, designed to save gas, but, as with every optional manually operated system, there is a tendency for the consumer to forget or not bother to switch over the valve at the appropriate time, with consequent dissatisfaction either as a result of unnecessarily high gas consumption or no hot water when required.

Since these valves were first conceived, however, Thomas Potterton (Heating Engineers), Ltd., have been keeping abreast of the times by developing and improving appliances which may be considered of great importance to the Industry. As a result of continued research into all matters appertaining to gas central heating and hot water supply, the firm have now introduced a modification of the type of valve to which reference has just been made, whereby with the help of a clock control its operation may be rendered entirely automatic—and this entirely without the aid of electrical mechanisms. It will be readily appreciated that if the reduction of heat supplied or the cessation of circulation is effected by reducing or stopping the amount of gas supplied to the boiler the temperature of the domestic hot water falls in an undesirable manner. In order to avoid this, the present control has been introduced to interrupt the secondary circulation without affecting the domestic hot water system.

The valve comprises a diaphragm secured at its periphery to the walls of a hollow casing. Projecting from the upper side of the diaphragm, and secured to it, is a rod which passes through the casing and at its upper end is pivotally connected to one end of a bent arm which is fixed to a valve flap in, say, the return pipe to the boiler on a water heating system. The casing below the diaphragm is gas-tight, provision being made for leading gas into this part of the casing. A weight on the upper part of the diaphragm balances the valve and link mechanism so that the diaphragm is normally depressed. When, however, sufficient gas pressure builds up below the diaphragm the latter is raised and operates the valve through the rod and link.

The connexion to the lower part of the casing for introducing the gas pressure may be a pipe taken from the main supplying the boiler. The pipe leading to the casing can, in one arrangement, branch from a pipe leading, via an air thermostat or other device which is capable of closing the latter pipe, to the boiler burner. Should the thermostat or other device close the pipe to the burner, as this pipe serves to by-pass the pipe leading to the casing, pressure will build up to move the diaphragm and operate the valve. The thermostat may be placed in a room heated by the water heating system and may be arranged to close the pipe when the room temperature rises to a predetermined point. The consequent movement of the diaphragm may then be employed to close the valve and stop the circulation of the water in the heating system. The thermostat may be substituted by or be additional to a time switch which closes the pipe which by-passes the pipe to the valve casing at a desired time, for example, at the end of

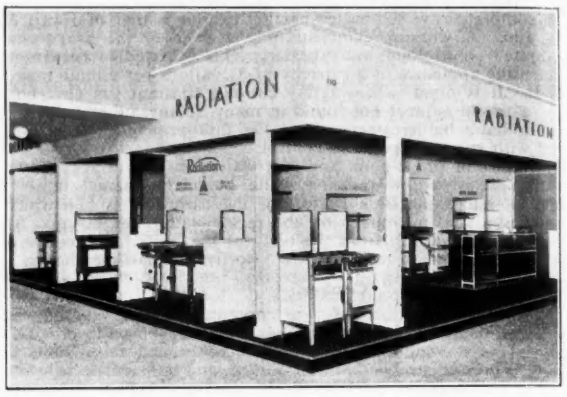


the day. A small control tap on the pipe to the diaphragm enables the valve to be maintained, if desired, at either the open or closed position.

This valve is demonstrated on the firm's stand, together with a representative range of their gas boilers and accessory apparatus. A continuously operating shower bath supplied from a "Rex" boiler shows the possibilities of gas in this direction, while a comprehensive series of photographs round the stand indicate a number of important central heating and hot water supply contracts which have been entrusted to Thomas Potterton, Ltd. Of interest is the improved design of their "Emperor" thermal storage set which is now encased in a "streamlined" body which greatly enhances its appearance, while at the same time giving easy access to the boiler parts through a flush-fitting panel released by a finger catch.

Radiation Display.

A full range of gas appliances for both domestic and large-scale catering applications is shown in the fine display arranged by Radiation, Ltd., on their comprehensive stand. In addition to "New World" cookers, including the new "365" model re-



cently described in these columns, the latest designs of "High Beam" fires in a wide variety of attractive coloured finishes show the public how the Gas Industry is meeting the current demand for brighter homes. The firm's latest multi-point and single-point water heaters are demonstrated in operation in a composite display at one end of the stand.

Modern Fixing Devices.

Rawlplug fixing devices are demonstrated on the stand of the Rawlplug Company, Ltd., including rawlplugs, rawlbolts, white bronze plugs, bolt anchors, and the necessary tools. The use of these products is covered by bathroom fittings and similar applications well appreciated by the gasfitter. Other products of the firm include "Durofix," a heat and waterproof adhesive, plastic wood, "Frostolac" heatless solder, soldering irons, &c.

Disappearing Cooker.

The "disappearing cooker" is a novel feature of the Vulcan Stove Company's stand. At the back of a recess stands one of the firm's glass-door cookers in coloured enamel finish. As the visitor looks at it, an extraordinary transformation takes place. Slowly the cooker fades away under one's very eyes to be replaced, as if by magic, with an entirely different model, of a different colour and with a solid door. A kettle and a saucepan materialize out of thin air and appear on the hotplate. In turn, this cooker vanishes and the first comes back again in its place. The explanation of this extraordinary disappearing trick is—but let the visitor go along and see for himself, and perhaps a representative of the firm will show him how it's done. It is certainly a most ingenious "stunt" display for the gas showroom.

The Vulcan Company are showing various types of cooker in attractive colour finishes, a special feature being made of the "armourplate" glass door which allows of visible cooking. The construction of this practically unbreakable glass prevents steaming over while maintaining good insulation of the oven. Cookers are also shown designed for use with Calor gas.

Gas in the Model Houses.

No fewer than nine of the model "Ideal" houses are equipped with gas appliances, some of them embodying an almost complete range of domestic apparatus. Among these are to be seen Bratt Colbran, Flavel, Main, Parkinson, and Radiation fires or radiators, Dean wash boilers, various modern cookers, "Ascot" water heaters, Potterton central heating apparatus, and gas-operated refrigerators, together with gas pokers and small appliances.

It is no small tribute to the reliance which is placed in gas and the growing appreciation of the efficient and trouble-free service rendered by the latest gas appliances that so comprehensive a selection has been made for the equipment of what may be regarded as the last word in modern building practice. Such "unsolicited" testimonials as these often carry more weight in the public mind than any amount of direct salesmanship.

Making Scientific Instruments - - - -

Delegates to the Eastern District Conference of the B.C.G.A. on March 29 were greatly interested by a visit to the Works of the Cambridge Instrument Company, Ltd. By courtesy of the Company, we are able to give details of some of the processes employed.

A Section of the Instrument Test Room.

The Cambridge Instrument Company, Ltd., originated from a small business formed by the late Mr. Dew Smith, a worker in physiology who, feeling the need for improvement in the design and manufacture of scientific instruments, entered into partnership with the late Mr. (subsequently Sir) Horace Darwin in 1881 for the purpose of carrying on this work.

They began operations as a private firm under the name of the Cambridge Scientific Instrument Company, with a small shop in Panton Street, Cambridge, in which six men were employed; in 1895, however, the business was formed into a limited liability company with Mr. Horace Darwin as Chairman. Physiological instruments were first manufactured, and later research instruments for the measurement of high temperatures. Manufacturers were then beginning to realize the importance of temperature measurement in their works processes and, as a result of the growing demand, many instruments sufficiently robust to withstand the rough treatment of the workshop, and yet capable of giving accurate measurements, were developed. Large numbers of laboratory instruments of high precision were also produced.

Works were acquired in Chesterton Road in 1899, and enlarged until in 1918 they covered an area of 30,000 sq.ft. In 1928 was added a three-storey building and workshop, with a mess room on the top floor capable of seating 300 persons. The year 1919 saw considerable expansion, the electrical instrument business of Mr. R. W. Paul, at New Southgate, London, being then taken over by the firm, the name of which was changed to the Cambridge and Paul Instrument Company, Ltd. The sales office and showrooms were in the same year removed from Cambridge to 45, Grosvenor Place, London, and in February last they were again removed to 13, Grosvenor Place, S.W. 1.

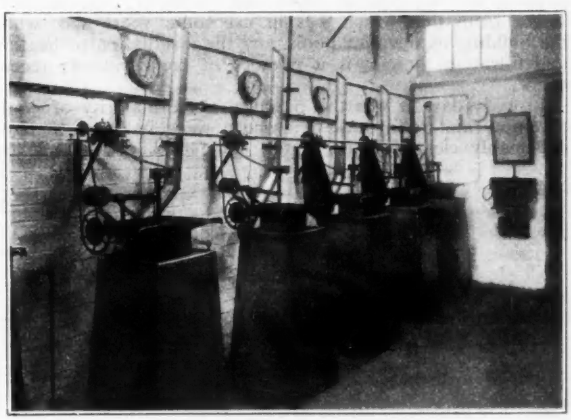
In 1922 an associated American Company was formed, with headquarters in New York, and in 1924 the name of the British Company was again changed to its present simpler title. The firm has now resident engineers in all the principal towns in this country, and in practically all important British possessions and foreign countries.

The Chesterton Road premises at Cambridge are the larger of the Cambridge Instrument Company's works, and it is there that the majority of engineering and industrial instruments are designed and built. No foundry equipment is provided at the works, as castings, forgings, pressings, and stampings are required in a great variety of sizes and alloys, and these are purchased from specialist firms. All these, however, are machined and finished by the firm. The machine shop is divided into four sections, occupied by toolmakers and grinding and polishing machines; milling machines; capstan lathes; and the remainder used for the production of dial, pressure, and draught gauges, &c. The chief tools include 23 capstan lathes, 12 milling machines, a combined boring and milling machine, and a Waltham thread-milling machine.

The assembly shop contains a number of interesting special appliances, such as scale dividing instruments, used for producing linear inspection scale for indicators and recorders from angular calibration readings. The scale is first sprayed with white cellulose enamel, then marked out in ordinary indian ink with the apparatus, and finally lacquered to protect the markings. Part of the assembly shop is used for fitting up pyrometers, indicators, and recorders, and the other part for work on general scientific instruments.

Adjoining the assembly shop is shop E, devoted to the manufacture of mercury-in-steel thermometers and thermographs. For calibration, melting ice is used for freezing point, and hypsometers for boiling point, while intermediate temperatures are obtained from water baths. For calibration at higher temperatures, gas-heated oil baths are used, fitted with mechanical stirrers. In every case the temperature of the bath, which is indicated by a carefully calibrated platinum resistance pyrometer, is automatically controlled and alarm signals are provided to indicate any deviation from the desired temperature.

Before despatch all instruments are calibrated and tested in the test rooms both as individual units and complete equipments. Ice baths, hypsometers, and molten-metal baths are used as standards, and the platinum-resistance thermometers indicating the temperature are periodically certified by the National Physical Laboratory. A special form of gas-heated furnace has been designed and set up in this department for testing optical and radiation pyrometers, such as the Fery Radiation Pyrometer and the Disappearing Filament Pyrometer, which is widely used in the Gas Industry for the determination of combustion chamber temperatures. The testing furnace consists essentially of a refractory sighting tube closed at the inner end and located in the axis of the inner of two concentric refractory cylinders near one end. The flame entering at the opposite end of the inner cylinder passes round the closed end of the sighting tube, and then out through the space between the inner and outer cylinders, escaping the same end at which it entered. The furnace, it is claimed, closely represents on a small scale the actual conditions under which radiation pyrometers are employed. Although the gas consumption is only 50 cu.ft. per hour, the sighting tube attains



Gas-Heated Oil Baths for Thermometer Calibration.

a temperature of 1,000° C. in 5 mins., of 1,200° C. in 15 mins., and 1,300° C. in 45 mins., at which temperature it remains constant. In the same department all thread recorders are tested to check the readings and the accuracy of the clock; each instrument being run for three weeks under observation before despatch.

A considerable amount of research work is necessary, both for the production of new designs and for meeting customers' special requirements. For this purpose a well-equipped research department has been established. There is also an experimental shop for the development of the mechanical details of new instruments, and mention may be made of the enamelling, lacquering, and plating equipment. In the latter, nickel, copper, zinc, silver, and gold plating are carried out, and in the adjoining shop, instrument cases are primed and filled before being passed on to the enamelling shop. In this there are three spraying hoods and three gas-heated ovens for drying, as well as a drying and cooling room.

Among the many products of the firm which are of interest to

the gas engineer mention has already been made of the disappearing filament pyrometers, the mercury-in-steel thermometers of both indicating and recording types, and the dial draught gauges. Other products familiar to our readers are the Cambridge gas regulator, which fits directly into gas supply pipes, and controls between temperatures of 60° and 800° F. with an accuracy of 1% full scale reading. The Thomas gas calorimeter and the Thomas recording gas meter are also well known to the gas engineer, the largest gas calorimeter installation in Great Britain being that at the Beckton Works of the Gas Light and Coke Company, which includes 23 Thomas calorimeters. A comparatively recent development has been the combination of both Thomas calorimeter and Thomas gas meter as a total heat meter; an example of this comprehensive installation is to be found at the Orgreave By-Product Works of the United Steel Companies, Sheffield. Thomas gas meters and calorimeters now in process of construction include installations for the Hemsworth Coke Ovens of the South Kirkby and Hemsworth Colliery Company, for the Appleby-Frodingham Steel Company, Scunthorpe, and for the Copenhagen Gas-Works.

Gas and the Filtration and Heating of Swimming Pools

by
WILLIAM L. HOWE, M.Inst.F.,
Industrial Sales Engineer, Nottingham Gas Department.

From a Paper delivered to the Midland Junior Gas Association on April 7.

Introduction.

Some three years ago, I had the privilege of addressing the members of this Association upon the subject of gas-fired boilers for central heating purposes. The subject of the present Paper may, I think, be considered as an extension of that particular use of gas, and it may be of interest in passing to mention that on that occasion three years ago, our central heating sales stood at 60 million cu.ft. per annum, while they are now in the region of 135 million cu.ft. per annum, an increase of 125% during this period.

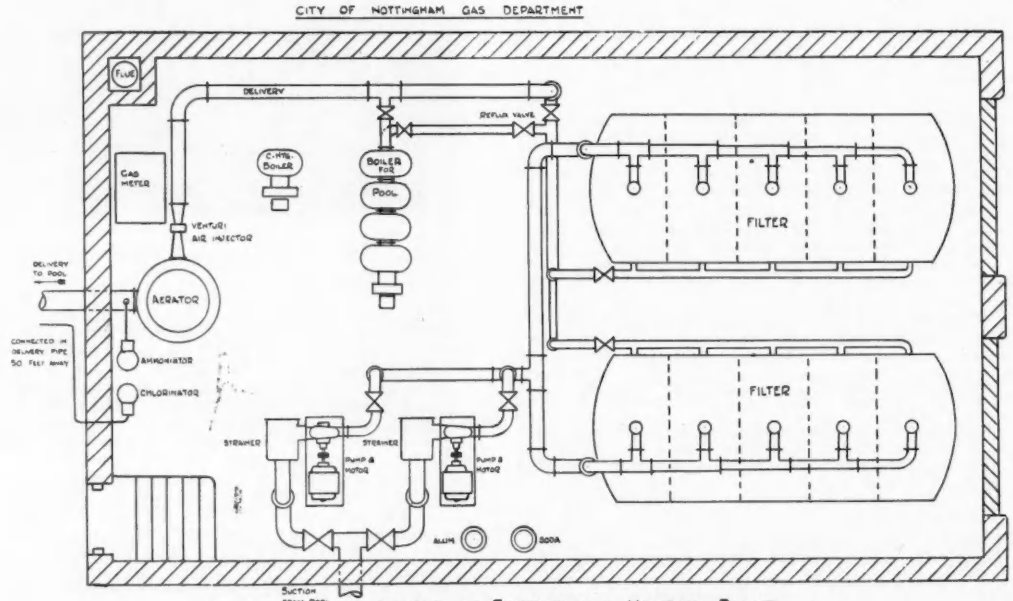
Filtration and Sterilization.

The filtration and heating of closed pools is no new departure, but the type of plant used to-day is somewhat different from that which was in use some years ago, while the building of open-air pools, and the installation of heating and filtration therein, is a practice of comparatively recent years.

In early days it was the practice in the majority of pools to empty and refill once or twice a week in order to have reasonably clean bathing water, and, speaking as one who learnt to swim in a pool operated in this way, I can testify to the unpleasant shock which one received upon diving into a pool at town water temperature on "clean water day" at about 7 a.m. There are still a few pools which are worked on this system to-day, but with the modern demand for continuous filtration, and the increasingly exacting requirements of the Ministry of Health regulations, it is probable that in the near future all such pools will be either converted or condemned. The first method of filtration adopted was by means of the gravity filter, in which the water from the pool is pumped on to the top of beds of sand and gravel and allowed to run through the bed by gravity back to the pond.

This is probably the most efficient method of filtration available, but owing to the slow speed of percolation, the filter beds need to be of considerable area, and therefore require much more housing space than is usually available, particularly in the case of closed pools. This method is widely used for purifying town water supplies, but in the case of a modern swimming pool the rate at which pollution takes place during heavy bathing loads would mean that a very large amount of space would be required for filter plant.

The next development was the pressure filter, which consists of a horizontal or vertical shell containing a graded sand bed, and through which the water to be purified is forced under pressure. The rate of filtration is usually in the region of 200 to 250 gallons per sq.ft. of sand area per



LAYOUT OF FILTRATION & HEATING PLANT
CARRINGTON OPEN AIR POOL NOTTINGHAM

hour, but there are filters on the market which work efficiently at still higher rates, as, for example, the plants installed at the Highfields, Bulwell, and Carrington pools, Nottingham, which are designed to operate at about 450 gallons per sq.ft. per hour.

Before proceeding further with a description of filtration systems, it might be as well to emphasize the absolute necessity for their use, and also that of sterilization. While filtration will cleanse the water of solid impurities and, by the addition of a coagulant, gelatinous and greasy matter, it will not render it bacteriologically safe for bathing. For this, sterilization is necessary.

There are many types of bacteria, both harmful, and unpleasant but harmless, which readily breed in swimming pools, and which can produce a formidable list of painful and dangerous diseases, particularly of the ear, nose, throat, and eyes.

It is therefore vitally necessary that the water should be rendered sterile. There are many methods of performing this, either by the addition of chemicals or the use of ozone or ultra-violet ray treatment. The latter methods are expensive for large pools, and for this reason a satisfactory combination of chemicals is usually employed. Chlorine either in liquid or gaseous form is almost universally used, often in combination with ammonia to form a compound known as "Chloramine." The chlorine renders the water sterile as it flows into the shallow end of the pool, but, as is well known, it quickly disperses in sunlight. In combination with ammonia, however, a proportion of "free" chlorine is maintained in the pool, thus rendering the water sterile during its movement through the pool.

Heating.

It would hardly be correct to say that heating is a necessity, but from a commercial point of view it is highly desirable. Even the hardiest swimmer will spend but little time in water standing at, say, 50° F., and the novice will certainly not be attracted.

The method of heating generally adopted in the older closed baths consisted of a steam boiler and calorifier through which the pool water was circulated. This method is still used in a number of pools, but it has the disadvantage that the temperature rise in the water passing the calorifier is usually fairly high, and in consequence one has the "patchy" effect often encountered in the older closed pools. In such pools one finds groups of bathers gathered round the inlet grilles, while the deep end is empty and deserted.

The modern method of pumping the water through the filters and then a very large portion of it through the boilers, is better practice, as the speed of travel of the water enables a low temperature rise per hour to be obtained, but of a large volume of water, thus ensuring the uniform heating of the pool contents. The normal temperature at which open-air pools are maintained is 68° F. to 70° F., but this must, of course, depend upon various conditions—*i.e.*, it would not be economic to maintain 70° F. at the beginning of a cold and wet season for the benefit of a few hardy swimmers, and, in consequence, many pools are started at 65° F. and gradually raised to 70° F. as the numbers attending increase.

Any fuel could obviously be used for pool heating, but the advantages of gas firing, so often enumerated in the Technical Press, are doubly important in the case of an open-air swimming pool. Cleanliness is of primary importance, and if a solid fuel is used there is the danger of smuts falling on to the surface of the water, together with the dust and dirt associated with ash removal. In addition, the high stack required precludes any attempt to make the surrounding buildings, cubicles, &c., architecturally beautiful. These points are so obvious that it is not necessary to stress them further.

Perhaps at this stage it may be as well to explain the importance of knowing something of filtration and its connexion with the heating problem. Prior to 1935 the Highfield Pool was operated on the fill and empty system, and the Nottingham Gas Department were asked to examine the possibility of heating by gas. The pool contains 755,000 gallons, and this amount was emptied and refilled once per week. Fortunately in this particular case water is free, being pumped from a gravel bed beneath the Highfield Lake and enters the pool at 50° F. to 55° F. This had to be raised to 65° F., and on the fill and empty system once per week for twenty weeks.

A cursory examination of the figures showed that the cost of this would be prohibitive, and it was recommended that a filtration plant be installed, so that the same water could remain in the pool throughout the season.

The comparison between the costs with these two systems was approximately as follows:

(*a*) *Filling and Emptying once Per Week.*

	£	s.	d.
Cost of pumping for 20 weeks	40	0	0
Cost of heating up 20 times, *plus* maintenance	390	0	0
Total (estimated)	£430	0	0

(*b*) *With Filtration System.*

	£	s.	d.
Cost of electricity for pumping	126	0	0
Cost of gas—Heating up, *plus* maintenance	80	12	0
Chemicals	26	18	0
Total (actual figures for 1936)	£233	10	0

It must be realized, of course, that for a true comparison, the interest and depreciation on the capital cost of filtration plant should be added to the latter, but this is far outweighed by the healthier conditions obtaining.

In the normal course of events, the City Engineer's Department would have undertaken the installation of the filtration and sterilization plant (as in the case of later pools), but as the Gas Department had dealt with the proposal in the preliminary stages, it was decided that we should supervise the installation of the whole plant.

The estimated cost of heating was calculated by devising a formula based on data available of existing pools operating at 65° F., the temperature specified to us by the Baths Committee. The temperature does, of course, often rise above 65° F. in mid-summer due to solar radiation, but artificial heating is not used above 65° F.

The estimation of gas consumption for heating an open-air pool is dependent upon three factors:

(1) Initial heating.
(2) Cost of heating make-up water required weekly (this is usually 2% to 10% of the volume of water in the pool per week). } = Total annual consumption.
(3) Heat losses to atmosphere.

Factors (1) and (2) can be calculated, but (3) is subject to wide variation due to weather conditions, the temperature at which the pool is maintained, and the operator's interpretation of this. In other words, the specified temperature might only be kept during periods when there is a reasonable bathing load. From an examination of all available figures on swimming pools it would appear that no formula could be devised to cover the varying consumptions of different pools, even though they may be stated to be maintained at the same temperature.

We have, therefore, assumed two estimates of heat losses representing item (3) which are purely empirical, but which give reasonable average results. In no case, however, should guaranteed figures be given, as the results obtained on swimming pools are, due to weather and other conditions, ten times more variable than any central heating proposition. The figures are as follows:

For pools to be maintained at 65° *F.*

Heat losses—Item (3)
1·5° F. per night for 7 weeks
1·0° F. „ „ 6
0·5° F. „ „ 7 „

For pools to be maintained at 70° *F.*

3° F. per night for 8 weeks
2° F. „ „ 5 „
1° F. „ „ 7 „

Consumptions estimated on the above data should cover the majority of cases with a reasonable margin, but it may be found that in practice the amount of gas used is less, as

the pool will probably not be maintained constantly at the stated temperature.

An example of the application of this data is given below:

Example—
Capacity of pool = 100,000 gallons.
Temperature to be maintained = 70° F.
Make-up water estimated at 5% of the total capacity of the pool per week.
Initial water temperature = 50° F.
Boiler efficiency = 90%.

Calculations—

(1) *Initial Heating*—

$$\frac{100{,}000 \times 10 \times 20^\circ}{100{,}000 \times 0{\cdot}9} = 222 \text{ therms} = (22{,}200{,}000 \text{ B.Th.U.})$$

Heat loss over 3 days at 3° per night—

$$\frac{100{,}000 \times 10 \times 3 \times 3^\circ}{100{,}000 \times 0{\cdot}9} = 100 \text{ therms} = (10{,}000{,}000 \text{ B.Th.U.})$$

Total .. .. .. = 322 therms = (32,200,000 B.Th.U.)

Size of boiler required to heat up pool in three days = (say) 500,000 B.Th.U./hr. rating.

(2) *Make-Up Water* = 5,000 gallons per week for 20 weeks.

$$\frac{5{,}000 \times 10 \times 20 \times 20^\circ}{100{,}000 \times 0{\cdot}9} = 222 \text{ therms}$$

(3) *Heat Losses*—

(*a*) $\frac{100{,}000 \times 10 \times 3^\circ \times 8 \times 7}{100{,}000 \times 0{\cdot}9} = 1{,}870$ therms

(*b*) $\frac{100{,}000 \times 10 \times 2^\circ \times 5 \times 7}{100{,}000 \times 0{\cdot}9} = 780$ therms

(*c*) $\frac{100{,}000 \times 10 \times 1^\circ \times 7 \times 7}{100{,}000 \times 0{\cdot}9} = 545$ therms

Estimated grand total for season = 3,739 therms

Highfields Pool.

To return to the description of this plant, two C3 "Vesta" boilers are installed giving a rated output of 2,400,000 B.Th.U./hour total. This output is sufficient to heat the contents of the pool, 755,000 gallons, to 65° F. in about three days during initial heating. The plant as finally installed consists of these boilers together with "Turnover" filtration plant, and Wallace and Tiernan sterilization apparatus.

The filtration plant is capable of a turnover period of eight hours—that is, the two centrifugal pumps operating the system together pass 100,000 gallons per hour. The water, drawn from the deep end is first passed through preliminary strainers, and thence *via* the pumps to the filters. Provision is made for the addition of coagulent and neutralizing chemicals such as alumina or alumina-ferric and soda solution through a venturi feed apparatus. The filters are housed in two steel shells each 7 ft. diameter by 17 ft. 6 in. long and each containing five sections, making a total of ten compartments, nine of which are filled with a sand bed 3 ft. deep. The tenth section remains empty during filtration and is required only for cleaning purposes, when the whole of the sand from each section is turned over by means of wash water and passes into the adjoining section. From the filters

Carrington Open Air Swimming Pool, Nottingham.

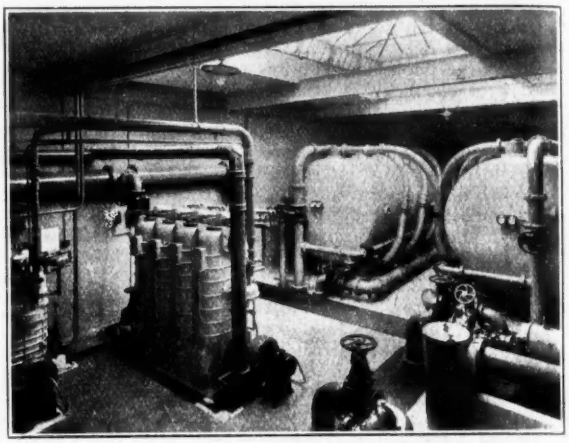
a large proportion of the water is by-passed through the boilers, after which it rejoins the main flow to the pool inlets.

From the boilers, the filtered and heated water passes to a closed aerator where air is intimately mixed with the water in a venturi tube. This has the effect of giving an attractive sparkle and brightness to the water. The final process before the water is returned to the pool is the sterilization of bacteria by the addition of chemicals. This is performed by a Wallace & Tiernan "Chloramine" apparatus, through which chlorine is admitted for sterilization purposes, and its combination with ammonia ensures a residue of free chlorine in the bath at all times.

The filtered, heated, and sterilized water is then re-admitted in the shallow end of the pool through four inlet grilles.

Bulwell and Carrington Pools.

These two swimming pools, of 374,000 gallons and 344,000 gallons capacity respectively, were completed in July of last year, and consequently there is little data available from their operation. It is not proposed to go into details regarding the plants installed, as they are practically identical with that in



Interior View of Filter House, Carrington Pool, Nottingham.

operation at Highfields, with the exception that the boilers are of different size and that in addition to the pool heating boilers a small "Vesta" boiler is used for providing heat in the dressing cubicles.

These pools nominally work at 65° F. to 70° F., and as they are expected to deal with many more bathers than the Highfields Pool due to their situations, the filter turnover period is shorter, being 3½ to 4 hours.

In general the following rules regarding the turnover period are required if sanction for a loan is expected from the Ministry of Health.

For indoor pools—turnover period 3½ to 4 hours. Small open air pools—turnover period 5 hours or less. Large open air pools—turnover period 6 hours. Not more unless the pool is exceptionally large and unlikely to be crowded, and in the case of seaside resort baths where the freshness and purity of the atmosphere make for maintained cleanliness to a greater extent.

In these cases an eight hour or even longer turnover may be found to be quite satisfactory.

Modernizing Equipment of Existing Closed Pool.

It is perhaps not generally realized what opportunities exist for obtaining the installation of gas-fired boilers, where old solid fuel fired boilers have reached the end of their useful life. On a basis of fuel costs alone it is common knowledge that gas cannot compete with solid fuel when new plant of each type is compared, and it is sometimes difficult to persuade prospective consumers that the accruing intangible advantages are worth the additional cost.

A somewhat different case presents itself, however, where it is proposed to replace an old and inefficient coal-fired unit. The consumer is used to paying a certain figure for his fuel, and if he can obtain all the advantages associated with gas firing with little or no increase in total costs, then the results are satisfactory for all concerned.

A case in point is the closed pool owned by the Hucknall Urban District Council, situated in our area of gas supply.

SWIMMING POOL DATA—OPEN AIR.

Installation.	Pool Capacity (Gallons).	Boiler and Rating. Total B.T.U. per Hour.	Annual Consumption, Therms.	Stated Average Water Temperature.	Yearly Season, Weeks.	Remarks.
Highfields, Nottingham ..	755,000	2 C3 Vesta 2,400,000	1936—6,125 1937—5,056	65° F.	20	Bathers. Spectators. 25,033 3,645 28,483 3,544
Carrington, Nottingham ..	344,000	C4 Vesta 1,600,000	1937—July, Aug., Sept. only, 3,230	65°–70° F.		28,323 10,237 Pool opened late in season
Bulwell, Nottingham	373,000	1 C3 Vesta 1 C2 Vesta 2,000,000	1937—Aug., Sept. only, 3,478	65°–70° F.		31,776 8,001 Do.
Aldenham Lodge Hotel, Radlett	165,000	B3 Vesta 750,000	1934—850	65° F.	19	Week-ends only. No heating in 1936 and 1937
Hinckley Lido	300,000	B2 Vesta 500,000	1935—3,240 1936—1,870	65° F.	16	
Stonehaven Corporation ..	320,000	C3 Vesta 1,200,000	1935—14,250 1936—16,092	68° F.	16 (1935) 18 (1936)	Bathers. Spectators. 43,262 58,634 in 1935
Ilkley Corporation	325,000	2 B3 Vesta 1,500,000	1935—10,000 1936—14,200 1937—10,724	65° F.	21 20	
Gosford Park, Coventry ..	310,000	1 B2 Vesta (D.H.W.) 1 C2 Vesta 1,050,000	1934—9,200 1935—3,500 1936—3,350	65°–70° F.	19	Includes consumption D.H.W.S. for showers, &c.
Chesterfield Corporation ..	65,000	B2 Vesta 500,000	1936—5,029	70° F.	16	
Tenterhouse, Rochdale ..	112,000	B2 Vesta 500,000	1936—9,937	70° F.	22	Gas consumption includes cafés, &c.
Ranelagh Club, Barnes, London	216,000	C2 Vesta 800,000	1935—1,662 1936—3,381 1937—1,866	72° F.	19	
Cheddar	85,000	B2 Vesta 500,000				
Pipers Vale, Ipswich .. .. (Ipswich Corporation)	210,000	C2 Vesta 800,000	1937—1,623 (June 13–Sept. 25)	70° F.	15 (1937)	Stated consumption 85·5 therms per week of 7 days
Bromhill Pool .. .. .. (Ipswich Corporation)	464,000	1 C3 Vesta 1 C2 Vesta 2,000,000				To be opened early in 1938
"Lockangles," Hampton Court	215,000	C2 Vesta 800,000	1936—2,675 1937— 958	70° F. (stated)	22 (approx.)	
Parkes Hydro, Worcester ..	120,000	B2 Vesta 500,000	1934—2,930	70° F.	21	
Kingfisher's Pool, Woodford Green	22,0000	Bonecourt 5 BH 1,200,000	1935—3,690 (June 23–Oct. 26) 1936—2,502 1937—Pool, 1,297 Clubhouse, 1,400	Slightly above atmosphere	All the year round	Includes club house gas. All the water passes from heater through cascade making system inefficient
Dunstable Downs	170,000	Bonecourt 5 BH 1,550,000	1935—1,400	69° F.	15	Used intermittently only
Luton Corporation	456,000	2 Bonecourt 5A 3,100,000	1936—11,488 (Initial heating, 1,455)	65° F.	23	
Morecambe Corporation ..	1,250,000	Cochran 2,750,000	1937—27,960	68° F.	12 (1937)	
Hotel Majestic, Bournemouth	8,500	Potterton series 2 4 section 288,000	1936—666 1937—715	72° F.	17 20	
Barnet	115,500	Potterton series 2 7 section 504,000				
"Beechwood," Hampstead Lane, Highgate	80,000	Potterton series 3 8 section 750,000	1937—651	72° F.	22	
"Greystokes," Canford Cliffs, Bournemouth	14,000	Potterton series 2 3 section 216,000	1937—309	74° F.	17	
"Fernwood," Atoon Road, Putney	20,000	Potterton series 1 6 section 198,000				
"Brown," Effingham, Surrey	13,000	Potterton series 1 3 section 99,000				
Queen Elizabeth Grammar School, Barnet	115,500	Potterton series 2 7 section 504,000		65° F.		Not in general use until April, 1938
Danson Park, Bexley Heath, Bexley U.D.C.	650,000	2 Ideal, 3 GB 10 1,820,000	1936—13,423 1937— 7,270	70° F.	10 19	
Tottenham Lido	490,000	Controlled flame Boilers 6 H.W. 2,000,000		68° F.		
Greswolde Hotel, Birmingham		Vesta B2 500,000				
Helensburgh	250,000	Vesta C2 800,000	1937—3,900 (Mid July–Mid Sept.)	68° F.	8	First season
Whitecroft Rd. School, Bolton		Bonecourt 6 B				

SWIMMING POOL DATA—CLOSED POOLS.

Installation.	Pool Capacity (Gallons).	Boiler and Rating, Total B.T.U. per Hour.	Annual Consumption, Therms.	Stated Average Water Temperature.	Yearly Season, Weeks.	Remarks.
Oldbury	108,000	3 Vesta B3 1 Vesta L.S.5 2,600,000				
Perth	159,000	4 Vesta C3 4,800,000				
Rothesay	100,000	3 Vesta C3 3,600,000				
Clapham Public Baths ..	121,000	5 Vesta S3 1 Vesta C3 4,200,000	11,650	72° F.	24	Includes 30,292 slipper baths
Aberdeen	250,000					
Chorley	71,000	2 Vesta C3 2,400,000		65° F.	50	Not yet completed (April, 1938)
Hucknall U.D.C., Nottingham	70,000	Vesta B2 (pool) Vesta B1 (slipper) 750,000	1937—3,740 (pool) 1,870 (slipper)	78° F.	29	
Sports Drome, Twickenham ..	120,000	Vesta B2 500,000	1935—2,348	72° F.	22	
Rotherham Corporation Municipal Baths	160,000	Vesta C3 (pool) Vesta B2 (D.H.W.) 1,700,000	45,820	76° F.	27	
Burnley Corporation Municipal Baths	30,000 & 39,000	2 Bonecourt 6B 2,800 lb. steam per hour	1933—42,909 1934—43,300 1935—44,880 1936—43,328		All the year round	Include, approx. 20,000 slipper baths 26,000 showers 500 vapour baths and central heating
Pontefract Corporation Municipal Baths	85,000 (2 baths)	Bonecourt 5B 1,000 lb. steam per hour	1934—16,700 1935—15,535 1936—16,908	78° F.	31 30 30	
Urmston U.D.C. Municipal Baths	180,000	2 Bonecourt 6B 2,800 lb. steam per hour	47,658	70° F. to 80° F.	20	Includes central heating, laundry, and slipper baths, &c.
D. Martin, 7, Wykeham Road, N.W. 4	2,900	Potterton No. 20 Victor—32,000	1935—700 1936—400	70° F.	40	
Falkirk Corporation Municipal Baths	85,000	3 Vesta steam 900 lb. per hour each	1933—42,762			251,208 swimmers 5,465 slipper baths and all services

This is of a capacity of 70,000 gallons, and a few slipper baths are also installed. The pool, previous to 1937, was worked on the fill and empty system and was heated by a saddle back type boiler of ancient design. This having reached a ripe old age, was finally condemned by the Insurance Company, when consideration had to be given to the provision of a new plant. It was finally decided slightly to enlarge the boiler house, and by using gas-fired boilers and a Royle filtration plant, it was found possible to house all the equipment with but little structural alteration. The boilers are of "Vesta" manufacture, a B2 serving the pool and a B1 supplying hot water for slipper baths.

The filter consists of a vertical shell 12 ft. diameter and 6 ft. high and containing a graded quartz sand bed through which the water is passed at the rate of 250 gallons per sq.ft. per hour. In this instance, as in general practice, the water is treated with carefully regulated amounts of coagulant solutions of soda and alumina-ferric prior to filtration, in order to precipitate colloidal matter. In addition the water is aerated with compressed air before passing into the filter. The question of whether water should be aerated before or after filtration, or both, is one which is a vexed question with filter makers, some claiming that the oxidizing effect is valuable from the sterilization point of view, while others state that its use merely adds a "sparkle" to the appearance of the water. In this case, however, aeration both before the filter, and after the boiler, is provided.

When the filter requires cleaning this is performed by reversing the flow of water, and forcing this upwards through the sand bed together with compressed air, this having the effect of thoroughly scouring the bed, the accumulated scum overflowing to waste. Chlorine and ammonia are again used for sterilization, the apparatus for its measurement and delivery being of Royles manufacture. The rate of turnover is once every 4 hours, the pump being capable of passing 190,000 gallons per hour.

In general, the standards of purity, sterility, colour, taste, smell, free chlorine content, albuminoid ammonia content, &c., conform to the standards set up by the Ministry of Health given in the specification to which the plant was installed.

The following figures have been supplied to us by the Surveyor to the Urban District Council of Hucknall, to whom the writer is indebted for permission to publish them.

Hucknall U.D.C.

Closed Pool, 75 ft. by 28 ft.; Capacity, 70,000 gallons; Temperature, 78° F.

Season 1936—*Solid Fuel.*

	£	s.	d.
63 tons 14 cwt. of coal 9 tons 6½ cwt. of coke	62	6	0
Labour attributed to boilers, &c.	73	0	0
Total	£135	6	0
Plus 3,943,000 gallons of water at 1s. 9d. per 1,000 gallons required to fill and empty twice per week	£345	0	0
Grand total	£480	6	0

(Electricity for pumping not given).

Season 1937—*Gas.*

	£	s.	d.
For pool heating, 3,740 therms For slipper baths, &c., 1,870 therms	96	0	0
Plus meter rent, &c. Labour attributed to boilers, &c.	16	0	0
Total	£112	0	0
Plus make up water, 68,570 gallons at 1s. 9d. per 1,000 gallons	£6	0	0
Grand total	£118	0	0

(Electricity for pumping not given).

Attendances.

	1936 (29 weeks).		1937 (29 weeks).	
Bathers	5,305	Bathers	6,369	
Children	5,893	Children	6,926	
Club	1,249	Club	1,250	
	12,447		14,445	(2,000 increase)
Slipper baths	227	Slipper baths	344	(117 increase)

Private Swimming Pools.

There are a number of large houses to which swimming pools of small size are attached, and to which the addition

of a small gas-fired boiler and filtration plant would greatly add to the pleasure and cleanliness of use.

Unfortunately, however, although the cost of a boiler for such pools is relatively low, the cost of the filter plant is not, and in the writer's opinion there exists a market for a compact filtration and sterilization plant suitable for such cases. As private pools do not have to provide for heavy bathing loads, and are not subject to any regulations, there appears to be no reason why a compact plant could not be designed to operate with a long turnover period, at a price to meet the private owner's purse. In stating this, the writer is well aware that a number of private pools have been fitted with plants of reputable makes, but these have been in the estates of really wealthy people or at roadhouses, while the reference above is to a man with an income of, say, £1,000 to £2,000 per annum who requires a small plunge pool of, say, 30 ft. by 12 ft. containing about 10,000 to 20,000 gallons.

While heating can easily be applied to such pools, and indeed only a small unit is required, the higher temperature of the water only promotes still further the growth of algæ and other organisms, if some method of sterilization is not used. The dosing periodically of the pool with chloride of lime will, of course, keep this down, but if this is done by an unskilled person the results may be very unpleasant, while without filtration the boiler water ways are likely to become quickly coated or corroded.

Conclusion.

The interest shown in swimming grows year by year and it is gratifying to note that in the majority of open air pools, gas-fired plant is being installed. It is not sufficient, however for the Gas Industry to wait for this and other such markets; we must pave the way for the future by propaganda and advertisement, particularly in relation to smoke abatement. The desire to have the advantages associated with clean fuels must first be created, when the question of cost will become of secondary importance. After all, to ride a bicycle, or, to go further back, to drive a horse and trap, provides the cheapest means of transport, yet the desire to own a car, created by skilful advertisement and by the advantages it obviously has over other means of transport, has made an ever increasing market possible, although the cost of running is far in excess of other and humbler means of locomotion.

If such results can be obtained in what is definitely a luxury trade, there is no logical reason why (with the education of the public to cleaner, though more expensive fuels, smoke abatement and convenience) the Gas Industry should not look forward to the future with optimism.

Discussion.

The PRESIDENT (Mr. E. T. Pickering) said the Nottingham Gas Department was to be complimented on the remarkable increase in the central heating load. It was often pointed out that the increasing tendency of the nation to lead outdoor lives was having an effect upon the amount of gas used, but the heating of outdoor swimming pools was one way of helping to retain the load. Commenting upon the attractiveness of the swimming pools, he said that by using gas for heating the water, the nuisance of smoke was eliminated, and in this way the beauty of the surroundings was preserved. In addition, the gas load came at the right time of the year. Referring to the loss of heat to atmosphere, he said that this would be affected largely by surface area, and asked whether the variation in depth of the pools would make an appreciable difference. The Nottingham Gas Department was giving members an opportunity of visiting in the summer the swimming pools referred to, and they were looking forward to making the journey.

Mr. F. A. JENKINS (Leamington), in proposing a vote of thanks to Mr. Howe, said the Paper was a valuable contribution to the records of the Association. There was no doubt that interest in swimming pools was increasing rapidly, and the Paper would be most useful when the heating of pools by gas was being considered. He asked if the Author had experienced any difficulty owing to the formation of scale due to the hardness of the water, and whether the chlorination of the water required any particularly skilled attention.

Mr. W. N. SMIRLES (Birmingham), in seconding the vote, said that the information given by Mr. Howe would be very useful from a propaganda point of view. People were inclined to the idea that the cost of heating outdoor swimming pools by gas would be prohibitive, and the information given by the Author would refute this effectively.

Mr. W. L. S. SPINKS (Birmingham) said he had noticed that a Bonecourt boiler shown on one of the slides had a screen in front of the burners, and he asked the reason for this.

Mr. F. A. C. PYKETT (Coventry) mentioned that at Coventry they also had a swimming pool heated by gas by means of "Vesta" boilers which were scientifically designed.

Mr. J. N. SHORROCK (Birmingham) asked if the atmosphere in a closed bath was similarly heated. He thought it might be possible to heat the water by means of a submerged combustion burner burning directly in the water, which would also help to sterilize by the introduction of SO_2 from the gas. He asked if the gas heated boilers were thermostatically controlled.

Mr. H. A. COWLES (Birmingham) said he had noticed that in some of the most modern baths the water, after standing for some time, became dull and slightly opaque, and asked if the Author could give a reason for this.

Mr. F. J. BENGOUGH (Birmingham) asked if the Author had experienced any difficulty in connexion with locking of either the chlorine or the air in the filtration plant, and whether any trouble had been experienced due to free chlorine being given off.

The Author's Reply.

Mr. HOWE, in replying to the discussion, said that one of his chief reasons for collecting the data was because they had been inundated with requests for such information, and he thought it time it was compiled for reference purposes. He could not say what proportion of pools was heated by gas, but thought the number of closed pools so heated was rather low; in the case of open pools the percentage was fairly high. It was a difficult matter to give definite figures in regard to heat losses, and it was almost impossible to calculate them, as they varied very widely. The temperature was not maintained from the beginning to the end of the bathing season. He did not think the depth of the water affected the matter to a great extent, and very little variation was found between the temperature of the water on the surface and the bottom of the pool.

With regard to the type of boiler used, he thought the cast iron boiler was best suited for the job as it was less liable to corrosion. He had experienced no trouble in connexion with the formation of scale, which he did not think would be formed until temperatures of 100°-120° F. was reached. Referring to the introduction of chlorine, it was important that the man in charge should know something about the job, otherwise he could make the water very unpleasant to bathe in. The quantity should be 0·2 to 0·5 parts per million in the pool, and the quantity could be very accurately measured with the apparatus provided.

With regard to the screen in front of the Bonecourt boiler, this was lined with asbestos sheet and had been fitted to deaden the noise of the burners.

With regard to the heating of the atmosphere of closed baths, he pointed out that heat was usually provided in the cubicles and round the glass roof in order to prevent condensation.

Referring to the use of submerged combustion burners, he said that this particular type of burner was not now on the market, and, in any case, could not be used for heating a swimming pool owing to the large volume of water to be treated. He thought the opaqueness of the water was due to the use of too much coagulant, and with a modern plant it should not be difficult to get the water perfectly clear.

Replying to Mr. H. J. Reynolds, Mr. Howe said that in Nottingham gas for heating swimming pools was charged at the same price as for central heating. With regard to air locks on the filters, provision was made at different points for the release of air in order to prevent this occurring.

Trade Notes

Alexander Wright & Co., Ltd.

The telephone number of Messrs. Alexander Wright & Co., Ltd., 1, Westminster Palace Gardens, Artillery Row, S.W. 1, has been changed to Abbey 2207.

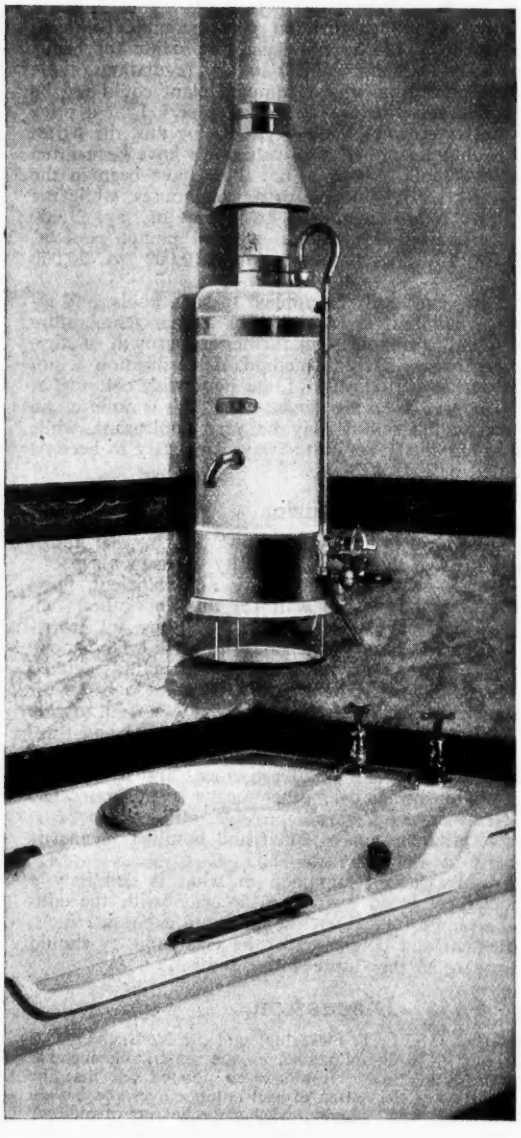
Whessoe W-D Electro-Detarrer.

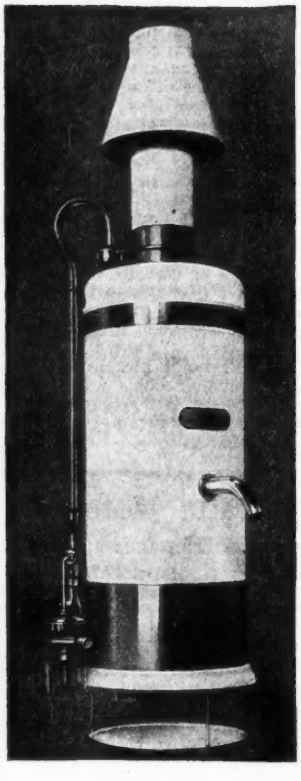
In our issue for April 6 we referred to a new brochure published by the Whessoe Foundry and Engineering Company, Ltd., describing the Whessoe W-D Electro-detarrer; and our review would make it appear that plants on this system are usually designed for a gas velocity of 3-7 ft. per second, that the tubes are from 6-8 in. in diameter and 9-12 ft. long, that the required voltage varies from 25-60 Kv., and that the current consumption ranges from 0·2-1 mA. per tube. Actually these figures cover the several types of electrical detarrers marketed. The specific figures for the Whessoe W-D plant are as follows: Gas velocity, 4-5 ft. per second; tubes, 6 in. in diameter and 9-11 ft. long; wires, $\frac{1}{16}$ in. in diameter; voltage, 25-30 Kv.

THE NEW LIDO Geyser embodies improvements which comply with modern standards of efficiency and performance for the supply of hot water instantaneously and continuously to the bath or for similar purposes.

COMBUSTION EFFICIENCY: The NEW LIDO Geyser conforms with the requirements laid down by The British Standard Specification for the "Combustion Testing" of Domestic Gas Appliances.

- ANTI-DOWN DRAUGHT BAFFLER is provided, finished in Vitreous Enamel.
- AUTOMATIC VALVE is supplied as standard.
- INTERLOCKING GAS & WATER COCKS are supplied as an alternative where the AutomaticValve is not required.
- QUICK RELEASE RUST-PROOFED BURNER detachable by one external union nut.
- CONDENSATION collected by a tinned copper gutter fitted with drain union.





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April 5th to 30th.

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NEW LIDO Geyser

Patents granted and pending

AUTOMATIC and INTERLOCKING TYPES

R. & A. MAIN LIMITED, LONDON AND FALKIRK

The Use of Gas for Industrial and Commercial Purposes

From a Paper read before the Wales and Monmouthshire Junior Gas Association at Neath on March 19, 1938.

by
ARTHUR L. THOMAS, A.M.I.G.E.,
Assistant Engineer, Neath Corporation Gas Department.

The progress and development of gas for industrial purposes at Neath has been rapid although faced with keen competition from electricity, crude oil, and cheap coal. In 1932, the Engineer and Manager of the Gas Department, Mr. W. Clark Jackson, decided to enter the field of gas utilization for industrial purposes, and as a start negotiated with a local

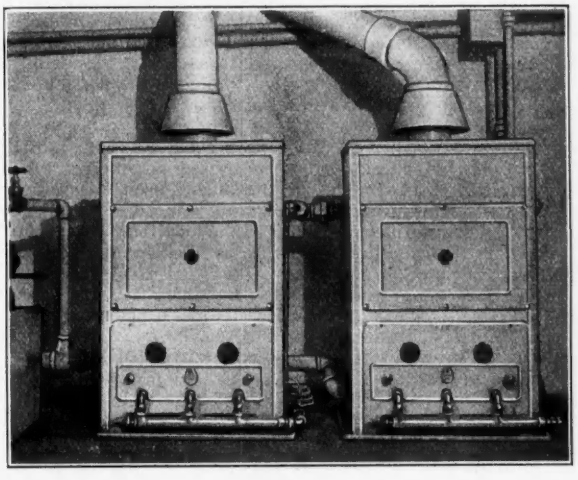

Fig. 1.

tinplate company for town gas-fired tin-pots. The Department was the first in Great Britain to adopt this scheme of tin-pot heating and was naturally faced with many difficult obstacles. Unfortunately we were compelled to give up the original method of heating. This particular tinplate works reverted to coal firing, but the management of another tinplate group, quick to see the advantages of gas, had one of their coal fired tin-pots converted to gas firing, utilizing a new design due to Mr. Jackson.

The new equipment was fitted to the three sections of the tin-pot—namely, the tin-pot, wash-pot, and grease hopper—each being separately controlled by a Keith Blackman automatic mixture control. The successful working of this particular pot led to the conversion of two other tin-pots of a similar but very much larger design. This Industrial job has, with the exception of one setback, due to the acid corrosion of a portion of the automatic mixture control, which caused back-firing, given very little trouble, and the maintenance of the installation is negligible compared with the saving in the cost of production per box.

Annealing of Steel Sheets.

This same company then decided to experiment on the annealing of steel sheets by town gas. These furnaces, designed jointly by Mr. Jackson and the Engineering Staff of the Company concerned, consist of firebrick walls with suitable flue arrangements for the products of combustion and are fitted with cast-iron doors operated by means of a winch, and sand sealed to prevent undue loss of heat and entry of air which would probably cause oxidizing of the steel sheets.

Low-pressure gas with high-pressure air is burned in the furnace under slightly reducing atmosphere conditions, using a special silica burner block. After the steel sheets have been subjected to a temperature of 900° C., and maintained at that temperature for a period of 15 minutes, the gas and air are turned off and the plates allowed to cool in the reducing atmosphere of the furnace. Although the working costs per box of gas fired compared with coal fired sheets is slightly higher, this is compensated for by the quality of plate produced.

The roll heater as used at the same works is a 2 in. wrought-iron tube, one end of which is welded to an injector burner with air control, the other end being pressed together to form a fish-tail. This is clamped to a strong portable tripod, the gas connexion being made to a 1 in. service by means of a flexible tube. The flame is adjusted to allow it to travel the whole length of the slowly revolving rolls at a point where the rolls meet. The rolls are brought to working temperature to prevent cracking due to the sudden entry of the hot steel bar. The consumption of the roll heater is 300 cu.ft. per hour.

The next industrial gas appliance that came into prominence in the Neath area was an apparatus for eliminating the small percentage of oxygen in the town gas to enable the local steel sheet and galvanizing works to utilize this gas as a reducing agent for special steel sheets. A description of the latter appliance is as follows: Gas is passed through a specially designed furnace comprising a short length of 4 in. tube heated externally and containing steel borings. At the predetermined temperature the hot steel borings react with the oxygen in the gas, removing it down to practically total elimination.

The central heating of various large buildings in the Neath area then called for our attention, the first being a small I.G.B.2 installation with a rated consumption of 66 cu.ft. per hour. There are now 8 installations of the " Ideal " boiler

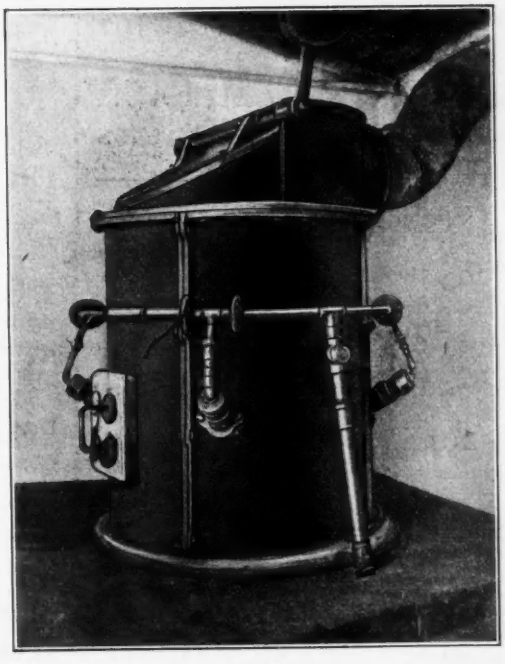

Fig. 2.

hot water circulator type and one Potterton boiler hot air type, all of which are working successfully.

A little trouble was experienced on one of the former installations due to sluggishness on the flow of water. The circuit was altered and has since proved itself very effective. Fig. 1 shows a typical installation at Neath's largest furniture stores. These are twin boilers of the G.B.7 series. The original boiler had to be replaced by two due to the inconvenience of flue arrangements and available headroom.

During 1935 a local rag stores was taken over by an enterprising firm who required a plentiful supply of hot water for the cleansing of bottles, jam jars, &c. We immediately considered the possibility of a substantial load, and after careful consideration designed an immersion heater capable of doing the necessary work. It consists of a mild steel tank 5 ft. square and 2 ft. 6 in. in depth. The combustion products of gas from an injector burner are passed through a series of tubes placed on the base of the tank which raises the temperature of the water to approximately 75° C. Twelve thousand jars were cleaned during the latter half of 1937 with a gas consumption of 23,300 cu.ft. A higher price can be obtained for a clean bottle or jar.

A similar use is made of gas at a local beer bottling factory, where the beer is pasteurized in large vats heated externally by a number of burners. The temperature of the beer as received from the brewers is very low and the beer is immediately bottled and sealed. The bottles of beer are then placed on perforated trays which are immersed in the vat. The water in the vat is raised to a temperature of 135° F.-140° F. (the exact temperature depends upon the specific gravity of the beer). The germ contained in the beer, which has up to now been lying dormant due to the low temperature, is revived, thereby extending the period for storage purposes. 1,550 gallons of beer were pasteurized during the month of January with a consumption of 28,000 cu.ft.

Last year the local sanitary authorities approached us for advice in the installation of a gas fired destructor at the Neath Corporation slaughter house. The destructor was fixed and a 2 in. service laid on. This appliance is shown in Fig. 2 and consists of a cast-iron structure, being lined internally with fireclay brickwork to withstand the high temperature necessary to burn any cattle refuse or even the whole carcase of tubercular cattle. It is heated by four burners placed at a tangent to the inner periphery.

The burners are lighted and the refuse is inserted through the charging door on to the base of the destructor. In a few hours such large quantities as 28 to 30 cwt. have been reduced to a fine ash with a consumption of 14,000 cu.ft.

During the latter part of 1936 a British engineering company took control of a local factory and equipped it with machinery suitable for turning, polishing, fixing, and testing aerial shells. The insides of these bombs were varnished and dried to prevent corrosion and rusting. To assist in the quick drying of the varnish the bombs were placed on skips and put in a room heated by hot air obtained from a small coke fired furnace.

The manager of this particular works approached us to fix a suitable gas burner equipment to cope with this work, giving us to understand that it was for emergency purposes only in the case of a breakdown in the electrical equipment of the blast for this coke furnace. After experiments on the gas burner it was decided to abolish the coke fired blast furnace, the comparative costs of gas and coke being decidedly in favour of gas. Gas heating also eliminated the possibility of grit adhering to the varnish—a most useful point. The varnish drying room was built of 16 in.-cavity walls with an insulating material in the cavity to prevent any undue loss of heat. The burner equipment comprised an injector of the usual Keith Blackman design, the burner itself consisting of a 2 in. wrought-iron tube drilled with $\frac{1}{4}$ in. holes placed 2 in. apart. A thermostatic governor of the " Perfecta " type maintained the temperature at 380° F. within a very small *plus* and *minus* variation.

The Department's industrial gas rate operates from a figure of 8·533d. for consumptions of 12,500 cu.ft. per month down to 3·734d. for consumptions of 4,166,700 cu.ft. per month. Service charges vary from 5s. per month with a 1 in. supply pipe up to £3 per month with 6 in. supply pipe. Special

THOMAS POTTERTON (HEATING ENGINEERS) LTD.,

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CENTRAL HEATING AND HOT WATER SUPPLY BY GAS

POTTERTONS'

"EMPIRE" AND "EMPEROR"

*GAS FIRED BOILERS

FOR CONSTANT HOT WATER SUPPLY

THE RESULT OF 40 YEARS' EXPERIENCE IN GAS BOILER CONSTRUCTION

. . . these heaters are unrivalled for maintaining a high efficiency over years of continuous hard work . . . satisfactory under hard water conditions—specially constructed to facilitate the easy removal 'in situ' of lime deposits . . . . . over 50,000 in use in London alone . . . .

* Pottertons' Gas-fired Boilers have been present at every IDEAL HOME EXHIBITION since the commencement in the year 1908, and the continuous improvement in design has been watched with approval by thousands of the Critical Public . . . Bronze Medal awarded by the Royal Sanitary Institute at the Smoke Abatement Exhibition, 1905

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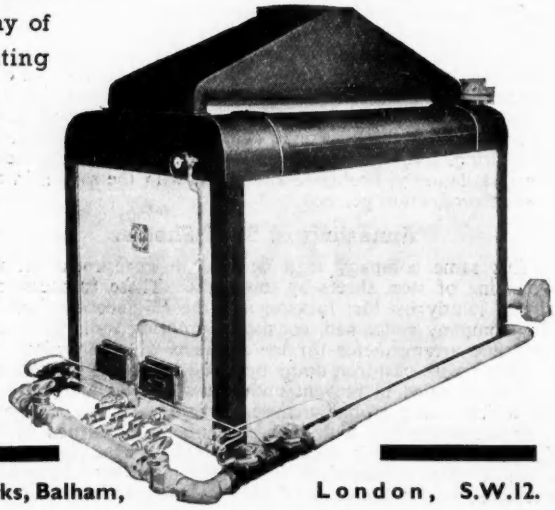
CAVENDISH WORKS RAVENSWOOD ROAD BALHAM, S.W.12

A cordial invitation to visit our stand at the IDEAL HOME EXHIBITION, OLYMPIA is extended to all members of the Gas Industry, where a working display of Central Heating with fully automatic control, Hot Water Supply for Domestic Purposes, and Hot Water Shower Plant are in continuous action.



Cavendish Works, Balham, London, S.W.12.

terms operate on consumptions larger than the maximum specified above.

The industrial gas sales for the year ended March 31, 1937, were 17,031,000 cu.ft., showing an increase of 10,097,000 cu.ft., or 59% over the previous year. The increase for the current year closing at the end of this month will again be of a large character, probably in the region of 60% to 70%.

Early in 1937 an enquiry was received from the Metal Box Company to install gas at their new factory at Neath. This new factory is situated about one mile from the Gas-Works. After careful consideration by the Manager and the Gas Committee an agreement was entered into and a 10 years' contract signed. Under this contract the Neath Corporation Gas Department has to supply, at a given pressure, all the gas required by the factory up to a quantity amounting to eventually 140 million cu.ft. per annum. This quantity constitutes the total annual output of many fair-sized gas-works.

This large increase in the output of gas has necessitated considerable extension at the works, including an installation of 6 new Woodall-Duckham vertical retorts, complete with waste-heat boilers, &c., and duplicate sets of the latest Humphreys & Glasgow entirely automatic C.W. gas plants each of 750,000 cu.ft. capacity per day. Extensions have also been made in the power house and boiler house and the opportunity has been taken to modernize both.

Included in this category are businesses such as hotels, cafés, fish and chip saloons, pastry bakers, &c. These businesses also are allowed to participate in the special industrial gas prices, although in addition we have other special rates, if required, based upon discounts on predetermined quarterly consumptions. The gas sold to this class of customer also shows a remarkable growth during the past few years.

Discussion.

Mr. H. V. WILLIAMS (Cardiff) asked what governors were fitted to industrial gas equipment.

Mr. THOMAS replied that all industrial gas appliances were governed by ordinary diaphragm governors to work at the following pressures: *Tin-Pots.*—The best practical results were obtained with a gas pressure of 15-tenths and an air pressure of 90-tenths. *Annealing Furnaces.*—Gas pressure, 11-tenths; air pressure, 110-tenths. *Roll Heaters.*—Gas pressure, 30-tenths. *Central Heating Boilers.*—Gas pressure, 15 to 22 tenths. The other gas appliances were governed to a working gas pressure of 3 in. to 3½ in. w.g.

Mr. W. R. BRANSON (Cardiff) enquired if the rate for central heating was similar to other industrial gas rates.

Mr. THOMAS replied that there was a special rate of 5·111d. per therm for central heating at Neath.

Mr. BRANSON asked what pressures were carried in the new 8 in. steel main to the metal box factory, and if this pressure had any effect on the district pressures.

Mr. THOMAS said the main as laid down for the metal box factory was for the supply of gas to this factory only at a pressure of 8 in. and was not connected to the district main.

Mr. K. M. ERNEST (Cardiff) asked what type of burner was used for roll heating.

The AUTHOR replied that it was designed locally and made by a Cardiff engineering firm.

Mr. D. E. WEST (Port Talbot) asked if there were any figures available for the amount of gas used at the de-oxidizer at the galvanizing works.

Mr. THOMAS said there was none.

A vote of thanks to Mr. Thomas was proposed by Mr. J. H. CHAPMAN and seconded by Mr. D. W. REES.

Wales and Monmouthshire Juniors Visit Neath

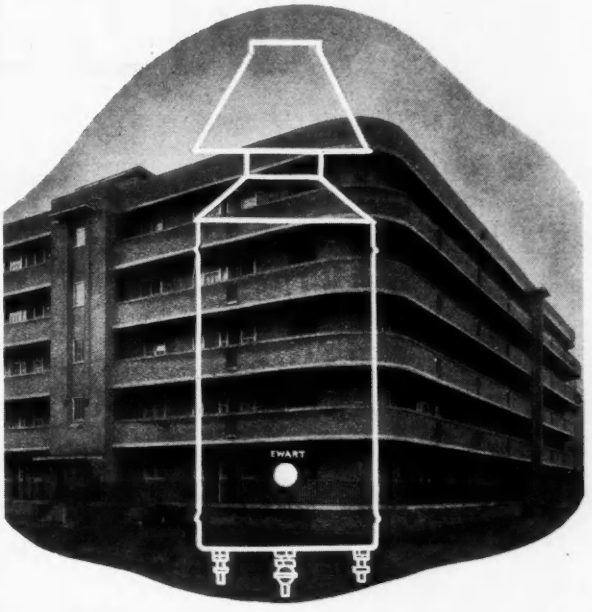
On Saturday, March 19, members of the Wales and Monmouthshire Junior Gas Association paid a visit to the Neath Gas-Works, where they had an opportunity of inspecting a new Humphreys & Glasgow automatic carburetted water gas plant, together with many other alterations to various parts of the works.

Following the inspection the visitors were entertained at tea at the Dorothy Café, Neath, where Mr. W. Clark Jackson, Engineer and Manager to the Gas Department, officially welcomed the Association.

Mr. E. E. MOORE proposed the vote of thanks to Mr. W. Clark Jackson, which was seconded by Mr. J. STEPHENSON (President of the Wales and Monmouthshire Association of Gas Engineers and Managers).

EWART'S

GAS WATER HEATERS



are installed in thousands in municipal estates to the satisfaction of the tenants. A constant hot water service is provided to Bath, Basin and Sink at a minimum cost, as storage losses are eliminated. The exact amount of water required is heated as it is drawn off. Hot water at any time, at any tap, and in any quantity.

Send for particulars of the 1938 "EMPIRE" Multi or Single-point Water Heater. The "EMPIRE" gives better service, easier fixing and reduced maintenance cost.

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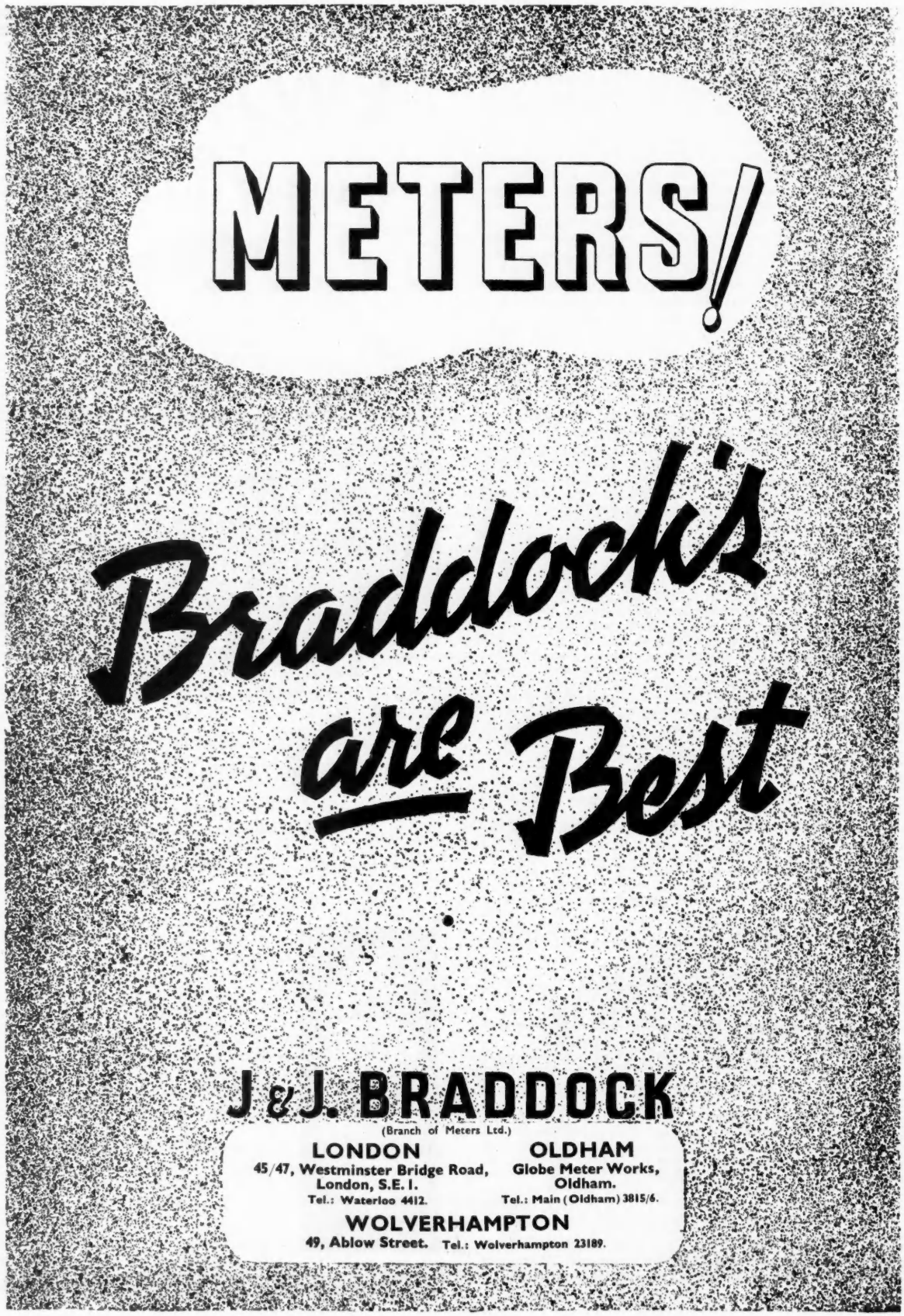
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49, Ablow Street. Tel.: Wolverhampton 23189.

Markets and Manufactures

Current Sales of Gas Products

The London Market

April 16.

Prices for Tar Products in the London market are steady at about the following levels:

Pitch, nominal at about 35s. per ton f.o.b.

Creosote, about 5¼d.

Refined tar, 3¾d.

Pure toluole, 2s. 1d. to 2s. 2d.

Pure benzole, 1s. 8d.

95/160 solvent naphtha, 1s. 7d.

90/160 pyridine, 10s. to 11s.

All per gallon naked at makers' works.

The Provinces

April 16.

Crude Gas-Works Tar, 20s. to 25s.

To avoid misunderstanding, it is necessary to state that the above price is not claimed to represent a market value. It is a price worked out from week to week upon a system which has been used for many years as a basis for the fixing of certain contracts for crude tar of varying qualities in different areas.

The average prices of gas-works products during the week were: Pitch—East Coast, 33s. to 34s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 33s. to 34s.* Toluole, naked, North, 1s. 7½d. to 1s. 9d. Coal tar, crude naphtha, in bulk, North, 7½d. to 8¼d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 5d. Heavy naphtha, North, 1s. 3d. to 1s. 3½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4⅞d. to 5¼d.; low gravity, 4½d. to 4⅝d. Heavy oils, in bulk, North, 5d. to 5¼d. Carbolic acid 60's, 3s. to 3s. 3d. Naphthalene, £13 10s. to £16. Salts, 80s. to 85s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal; "B" quality unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Scotland

GLASGOW, *April* 16.

There is still very little new business being conducted in this market and therefore, in most cases, prices remain easy.

Crude gas-works tar.—Actual value remains at 37s. to 38s. per ton *ex* works in bulk.

Pitch can be secured in substantial quantities at round 26s. to 27s. per ton f.o.b. for export, and about 25s. to 26s. per ton *ex* works in bulk for home trade.

Refined tar is being tendered to most counties on the basis of the fixed price of 3¾d. to 4d. per gallon f.o.r. naked for home trade. The export price is unchanged at 3d. to 3¼d. per gallon in buyers' packages at makers' works.

Creosote oil.—Although new business is quiet makers are well sold forward on contract and quotations are steady as follows: Specification oil, 5d. to 5¼d. per gallon; low gravity, 6¼d. to 6½d. per gallon; neutral oil, 5d. to 5¼d. per gallon; all *ex* works in bulk.

Cresylic acid.—Very little interest is being taken in this product and values are nominal as under: Pale, 97/99%, 2s. 3d. to 2s. 6d. per gallon; dark, 97/99%, 2s. to 2s. 3d. per gallon; and pale, 99/100%, 2s. 6d. to 2s. 8d. per gallon; all according to quality, *ex* works in buyers' packages.

Crude naphtha continues to command 6d. to 6½d. per gallon *ex* works in bulk, according to quality.

Solvent naphtha is quiet. 90/160 grade is 1s. 5d. to 1s. 5½d. per gallon, and 90/190 heavy naphtha is 1s. 1d. to 1s. 2d. per gallon.

Motor benzole is called 1s. 4½d. per gallon.

Pyridine.—90/160 grade is now 10s. 6d. to 11s. 6d. per gallon, and 90/140 grade 11s. 6d. to 12s. 6d. per gallon.

Benzole Prices

These are considered to be the market prices for benzole at the present time:

	s.	d.		s.	d.			
Crude benzole..	0	9	to	0	9¾	per gall.	at works	
Motor „ ..	1	2¾	„	1	3	„	„	„
90% „ ..	1	3¾	„	1	4	„	„	„
Pure „ ..	1	7¾	„	1	8	„	„	„

Contracts Advertised To-Day

Coal.
Burnley Gas Department. [p. 194.]

Gasholder.
Lincoln Gas Department. [p. 194.]

Mainlaying, &c.
Milford Haven Gas and Water Department. [p. 194.]

Mains and Specials.
Milford Haven Gas and Water Department. [p. 194.]

Pipes and Specials.
Southport Gas Department. [p. 194.]

Special Order Application

Application is to be made to the Board of Trade by the Cefn Mawr and Rhosymedre Gas Company, Ltd., for a Special Order under the Gas Undertakings Acts, 1920 to 1934, to authorize the Company to supply gas within certain specified additional areas, to provide for charging for gas on a thermal basis, and for other purposes.

Calorific Value Declaration

The Taunton and District Gas Company in pursuance of the Taunton Gas Charges Order, 1921, give notice that as from July 14, 1938, they will supply gas of the gross calorific value of 475 B.Th.U. per cu.ft., except in that part of the Company's area supplied from the Ilminster Works which is comprised by paragraphs 6 and 7 of Part I and Part II of the First Schedule of the Taunton Gas Order, 1936, where the present calorific value will remain unchanged.

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METROTECT

a bituminous paint producing a pleasant satin black finish with highly waterproof and anti-corrosive properties.

Protects steel-work which is continuously or periodically immersed in water. Does not become brittle on prolonged atmospheric exposure. METROTECT flows freely under the brush and can be applied quickly and without effort even in cold weather.

Prices and further particulars from—

SOUTH METROPOLITAN GAS CO.

PRODUCTS DEPARTMENT,
REGIS HOUSE,
KING WILLIAM STREET,
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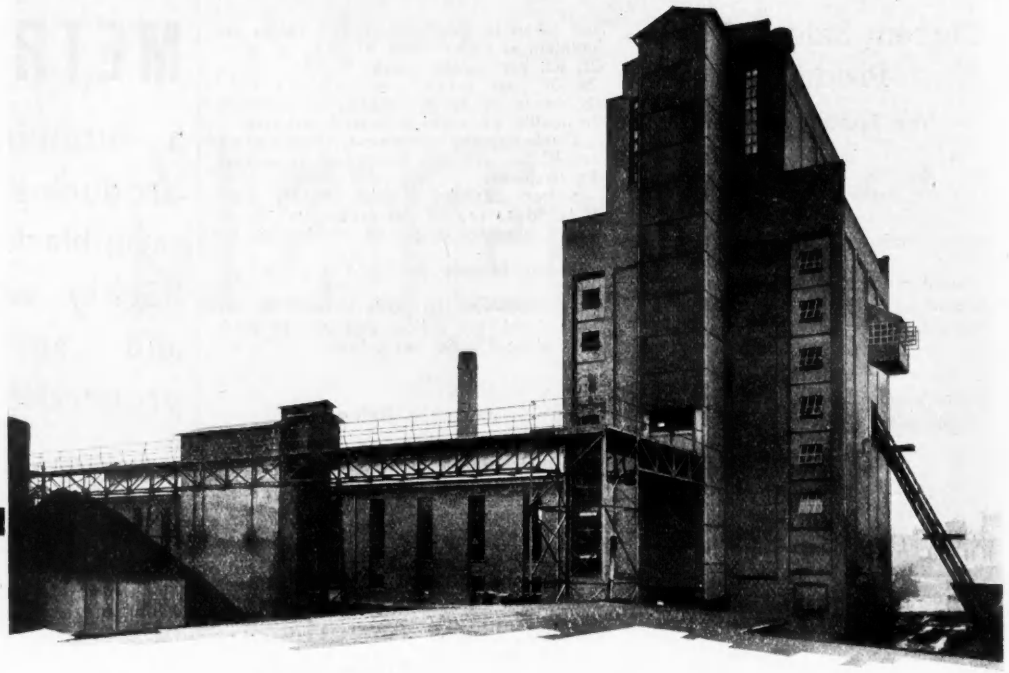

"... New carbonizing plant of the most modern description ..."

AT SVENDBORG, DENMARK

The installation of Glover-West continuous vertical retorts installed for the Svendborg Municipality has given results entirely fulfilling expectations. An 8-retort unit served by an automatic skip-hoist, waste-heat boiler, and coke grading unit, it is an ideal plant for a progressive works with a 70-millions annual demand. And as in the case of many other prominent summer resorts using town gas produced in Glover-West verticals, local amenities have received due consideration in the architectural treatment of the building.

Carbonizing plants of West manufacture to the total of 422 have been built or are now on order, distributed over 24 countries.

THE SOCIETY OF BRITISH GAS INDUSTRIES 1905

GLOVER-WEST VERTICALS

GLOVER-WEST VERTICAL RETORTS • WESTVERTICAL CARBONIZING CHAMBERS

WEST'S GAS IMPROVEMENT CO. LTD.,

MANCHESTER: Albion Ironworks, Miles Platting ■ LONDON: Columbia House, Aldwych, W.C. 2

GAS STOCKS AND SHARES

The recovery in stock markets continued last week despite the approaching holidays. It was assisted by the lessening of the tension over the European situation, and doubtless the signing of the Anglo-Italian pact will brighten up conditions still further during the current week. The steady buying of British Government securities has given rise to the belief that any heavy addition to direct taxation in the Budget on April 26 will be avoided. Home rails, on the other hand, were somewhat depressed by the poor traffic receipts. In the home industrial market supplies were short, and this fact was partly responsible for the upward movement in prices. The more speculative sections were also active, oils particularly so, while rubbers and mining shares presented a brighter appearance.

The Gas market was fairly well supported and prices on the whole showed few changes. It is regretted that owing to the holidays the closing official quotations are not available. It will be seen, however, that by Tuesday Gas Light units had hardened a further 3d. to 23s. 3d., which price, by the way, is 3s. 9d. below last year's best, and that Imperial Continental had dropped a further point to 117½. The latter recorded a sharp rise of about 5 points towards the close by the restoration of confidence on the formation of M. Daladier's government, and it would not be surprising to see this stock recover a great deal more of its previous losses—the price range last year was 139-165.

The accounts of the United Kingdom Gas Corporation, Ltd., for 1937 show a very satisfactory increase in profits. The net revenue amounted to £110,188, as compared with £87,829 for 1936, and a further £10,000 has been set aside to write off various intangible balances. The Directors recommend a final dividend of 3%, making 5% for the year (the same), and the carry-forward, after providing for the dividend on increased preference capital, is raised to £13,226 against £9,773.

Official Quotations on the London Stock Exchange

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Apl. 12.	Rise or Fall on Week.
1,767,439	Mar. 7	8	8	Alliance & Dublin Ord. ...	140—150	...
374,000	Dec. 13	4	4	Do. 4 p.c. Deb. ...	95—100	...
558,190	Nov. 15	5	5	Asscd. Gas & Water U'd'ts Ord.	18/—20/–	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	19/—21/–	...
216,041	,,	—	§–/4	Do. 4 p.c. Red. Cum. Pref.	19/—20/–	...
278,590	,,	§–/2⅝	4	Do. 4 p.c. Irred. Cum. Pref.	17/—19/–	...
500,000	Mar. 7	3½	3½	Do. 3½ p.c. Red. Deb. ...	94—99	...
558,890	Feb. 21	7	7	Barnet Ord. 7 p.c.	158—163	...
300,000	Apl. 4	1/4½	1/9½	Bombay, Ltd.	25/—28/–*	...
179,915	Feb. 21	9½	9½	Bournemouth sliding scale ...	195—205	+½
590,407	,,	7	7	Do. 7 p.c. max. ...	156—161	...
493,960	,,	6	6	Do. 6 p.c. Pref. ...	132—137	...
50,000	Dec. 13	3	3	Do. 3 p.c. Deb. ...	78—83	...
262,025	,,	4	4	Do. 4 p.c. Deb. ...	98—103	...
335,000	,,	5	5	Do. 5 p.c. Deb. ...	115—120	...
357,900	Feb. 21	7½	7½	Brighton, &c., 6 p.c. Con. ...	145—150	...
649,955	,,	6½	6½	Do. 5 p.c. Con. ...	128—133	...
205,500	,,	6	6	Do. 6 p.c. 'B' Pref.	125—130	...
855,000	Mar. 7	7	8	British Ord.	138—143	...
100,000	Dec. 13	7	7	Do. 7 p.c. Pref.	142—147	...
350,000	,,	5½	5½	Do. 5½ p.c. 'B' Cum. Pref.	110—115	...
120,000	,,	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
450,000	,,	5	5	Do. 5 p.c. Red. Deb. ...	102—107	...
450,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
100,000	22 May'33	6	4	Cape Town, Ltd.	1⅛—2½	...
100,000	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1⅛—3½	...
150,000	Dec. 13	4½	4½	Do. 4½ p.c. Deb. ...	65—75	−2½
626,860	Feb. 7	6	6	Cardiff Con. Ord.	120—125	...
237,860	Dec. 13	5	5	Do. 5 p.c. Red. Deb.	106—111	...
98,936	Mar. 21	2/-	2/-	Colombo Ord....	1⅝—1⅞	...
24,510	,,	1/4⅛	1/4⅛	Do. 7 p.c. Pref.	23/—25/–	...
739,453	Mar. 21	-/11·48	-/11·48	Colonial Gas Assn. Ltd. Ord.	16/6—18/6	...
296,144	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	21/6—23/6	...
1,775,005	Feb. 7	5	5	Commercial Ord.	83—88	...
620,000	Nov. 29	3	3	Do. 3 p.c. Deb. ...	73—78	...
286,344	Feb. 7	5	5	Do. 5 p.c. Deb. ...	113—118	...
807,560	Feb. 21	7	7	Croydon sliding scale... ...	137—142	...
644,590	,,	5	5	Do max. div.	107—112	...
620,385	Dec. 13	5	5	Do. 5 p.c. Deb.	115—120	...
239,000	Feb. 7	5	5	East Hull Ord. 5 p.c.... ...	96—101	...
185,355	Feb. 21	6	6	East Surrey Ord. 5 p.c. ...	118—123	...
176,211	Dec. 13	5	5	Do. 5 p.c. Deb. ...	112—117	...
250,000	Nov. 15	7	4	Gas Consolidation Ord. ...	19/—21/–	...
250,000	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	18/—20/–	...
19,223,324	Feb. 7	5⅝	5⅝	Gas Light & Coke Ord. ...	22/9—23/9a	+–/3
2,600,000	,,	3½	3½	Do. 3½ p.c. max. ...	81—84	...
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref.	99—102	...
2,993,000	Jan. 17	...	3½	Do. 3½ p.c. Red. Pref.	100½—102½	...
8,602,497	Nov. 29	3	3	Do. 3 p.c. Con. Deb.	78—81	...
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb.	112—115	...
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb.	110—113	...
700,000	Mar. 7	3½	3½	Do. 3½ p.c. Red. Deb.	97—100	...
270,466	Feb. 21	6	6	Harrogate New Cons. ...	118—123	...
157,500	Mar. 21	1/2⅝	1/‡	Hong Kong and China Ord	⅜—1*	...
213,200	Feb. 7	6	6	Hornsey Con. 3½ p.c. ...	105—115	...
5,600,000	Nov. 1	12	8	Imperial Continental Cap. ...	115—120	−1
223,130	Jan. 17	3½	3½	Do. 3½ p.c. Red. Deb. ...	88—93	...
285,242	Feb. 21	8½	8½	Lea Bridge 5 p.c. Ord. ...	167—172	...
11,751	Feb. 21	8	10	Maidstone 5 p.c. Cap.... ...	175—185	...
63,480	Dec. 13	3	3	Do. 3 p.c. Deb. ...	70—75	...
75,000	Nov. 29	†10	†10	Malta & Mediterranean ...	142—147	...
392,000	Apl. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	99—102*	...

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Apl. 12.	Rise or Fall on Week.
231,977	Feb. 21	5	5	M.S. Utility 'C' Cons. ...	99—104	...
968,658	,,	4	4	Do. 4 p.c. Cons. Pref.	95—100	...
360,075	Dec. 13	4	4	M.S. Utility 4 p.c. Deb. ...	97—102	...
148,955	,,	5	5	Do. 5 p.c. Deb. ...	113—118	...
675,000	Nov. 15	†9	†6	Montevideo, Ltd.	73—78	−2
250,000	Mar. 7	7½	7½	North Middlesex 6 p.c. Con.	145—150	...
396,160	Feb. 7	5	5	Northampton 5 p.c. max. ...	105—110	...
300,000	Oct. 18	†7	†9	Oriental, Ltd.	153—158	...
468,537	Dec. 13	8	8	Plymouth & Stonehouse 5 p.c.	154—159	...
621,667	Feb. 7	8½	8½	Portsmouth & Gosport Cons.	160—165	...
241,446	,,	5	5	Do. 5 p.c. max. ...	102—107	...
73,350	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
247,966	Dec. 13	4	4	Primitiva 4 p.c. Cons. Deb. ...	98—103	...
625,959	Jan. 17	4	4	Do. 4 p.c. Red. Deb. ...	95—100	...
15,000	Mar. 21	6	6	San Paulo 6 p.c. Cum. Pref. ...	8⅜—9⅛	...
441,275	Sept. 20	1/1½	1/1½	Severn Val. Gas Cor. Ld. Ord.	21/—23/–	...
460,810	Mar. 21	–/10⅛	–/10⅛	,, ,, 4½ p.c. Cum. Pref.	19/—21/–	...
133,201	Feb. 7	8½	5	Shrewsbury 5 p.c. Ord. ...	128—133	...
9,000	June 7	4	4	South African Ord.	3⅜—4⅜	...
1,371,752	Sept. 6	1/2⅜	1/2⅜	South East'n Gas Cn. Ld. Ord.	23/—25/–	...
871,636	Mar. 7	–/10⅛	–/10⅛	Do. 4½ p.c. Red. Cum. Pref.	20/—22/–	...
498,818	,,	4	4	Do. 4 p.c. Cum. Pref. ...	18/—20/–	...
450,000	Feb. 7	4	4	Do. 4 p.c. Deb.	100—103	...
150,000	,,	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—98	...
6,709,895	Feb. 7	6	5	South Met. Or.d.	104—107	...
1,135,812	,,	6	6	Do. p.c. Irred. Pf. ...	130—135	...
850,000	,,	4	4	Do. 4 p.c. rred. Pf. ...	97—100	...
1,895,445	Dec. 13	3	3	Do. 3 pc. IDeb. ...	78—81	...
1,000,000	Jan. 17	5	5	Do. 5 p.c. Red. Deb....	109—112	...
1,543,795	Feb. 7	6	6	South Suburban Ord. 5 p.c. ...	118—123	...
512,825	,,	5	5	Do. 5 p.c. Pref....	110—115	...
500,000	,,	4	4	Do. 4 p.c. Pref....	95—100	...
250,000	,,	§18/9	3⅜	Do. 3⅜ p.c. Red. Pref.	98—101	...
888,587	Dec. 13	5	5	Do. 5 p.c. Deb....	115—120	...
250,000	,,	4	4	Do. 4 p.c. Deb....	97—100	...
200,000	Sept. 20	...	3½	Do. 3½ p.c. Red. Deb.	94—99	...
427,859	Nov. 1	1/2½	9½	S. Western Gas & Water Ord.	18/6—20/6	...
160,523	,,	–/10½	–/10½	Do. 4½ p.c. Red. Cum. Pf.	19/6—21/6	...
110,000	Dec. 13	4	4	Do. 4 p.c. Red. Deb. ...	97—102	...
750,541	Feb. 7	5	5½	Southampton Ord. 5 p.c. ...	109—114	...
148,836	Dec. 13	4	4	Do. 4 p.c. Deb.	96—101	...
350,000	Feb. 7	5½	5½	Swansea 5½ p.c. Red. Pref. ...	108—113	...
94,000	Jan. 3	3½	3½	Do. 3½ p.c. Red. Deb. ...	95—100	...
1,076,490	Feb. 7	6½	6½	Tottenham and District Ord.	126—131	...
409,835	,,	5½	5½	Do. 5½ p.c. Pref....	119—124	...
62,235	,,	5	5	Do. 5 p.c. Pref....	108—113	...
371,850	Dec. 13	4	4	Do. 4 p.c. Deb....	97—102	...
85,701	July 19	‡6	6	Tuscan 6 p.c. Red. Deb. ...	96—101	...
888,629	Apl. 4	4	6	U. Kingdom Gas Cor. Ord....	18/6—20/6*	...
937,743	Nov. 15	4½	4½	Do. 4½ p.c. 1st Cum. Pref.	19/6—21/6	—/6
500,000	,,	...	–/1·15	Do. 4 p.c. 1st Red. Cum. Pf.	19/—21/–	...
745,263	Dec. 13	4½	4½	Do. 4½ p.c. 2nd Non-Cum.Pf.	16/6—18/6	...
1,000,000	Mar. 7	3½	3½	Do. 3½ p.c. Red. Deb. ...	96—99	...
373,939	Feb. 7	7	7	Uxbridge, &c., 5 p.c.	133—138	...
133,010	,,	5	5	Do. 5 p.c. Pref. ...	108—113	...
1,371,138	Feb. 7	7	7	Wandsworth Consolidated ...	135—140	...
2,525,768	,,	4	4	Do. 4 p.c. Pref. ...	96—101	...
1,343,964	Dec. 13	5	5	Do. 5 p.c. Deb. ...	116—121	...
383,745	,,	4	4	Do. 4 p.c. Deb. ...	98—103	...
558,342	Feb. 7	7	7	Watford and St. Albans Ord.	135—140	...
200,000	,,	5	5	Do. 5 p.c. Pref. ...	110—115	...
200,000	,,	5½	5½	Do. 5½ p.c Pref. ...	120—125	...
200,000	Nov. 29	4	4	Do. 4 p.c. Red. Deb.	97—102	...
100,000	,,	3½	3½	Do. 3½ p.c. Red. Deb.	95—100	...

a.—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax ‡ For year. § Actual.

Supplementary List and Provincial Exchanges overleaf.

STOCK AND SHARE LIST—Cont.

Supplementary List, not Officially Quoted, London

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Apl. 14.	Rise or Fall on Week.
202,152	Mar. 21	5	5	Ascot Ord.	103—108	...
128,182	Dec. 13	5	5	Do. 5 p.c. Pref.	108—113	...
31,035	Mar. 21	...	-/4½	Associated Utilities 4 p.c. Pref.	16/—18/-	...
100,000	Dec. 13	...	3½	Do. 3½ p.c. Red. Deb....	95—100	...
17,000	Feb. 21	8	8	Bognor Orig. Ord. 'A' ...	155—165	...
62,210	,,	8	8	Do. New Addl. 'A' ...	155—165	...
87,160	,,	7	7	Do. New 7 p.c. max. ...	152—157	...
37,440	Feb. 7	10	10	Cam. Univ. & Town10 p.c. max.	190—200	...
125,970	,,	7	7	Do. 7 p.c. max.	135—140	...
39,025	,,	5	5	Do. 5 p.c. max.	97—102	...
96,410	Feb. 7	4½	4½	Cardiff 4½ p.c. Pref.	95—100	...
150,000	Feb. 21	4	4	Croydon 4 p.c. Pref.	95—100	...
130,000	Dec. 13	4	4	Do. 4 p.c. Deb.	97—102	...
65,000	Mar. 7	7½	8½	Eastbourne 'A' 5 p.c. ...	155—160	...
198,000	,,	6	7	Do. 'B' 3½ p.c.	126—131	...
112,312	,,	5	5	Do. 5 p.c. Pref.	107—112	...
130,000	Dec. 13	5	5	Do. 5 p.c. Deb.	113—118	...
24,000	Feb. 21	8½	8½	Great Yarmouth 8½ p.c. max.	43—48	...
59,400	,,	7½	7½	Do. 7½ p.c. max.	33—38	...
51,160	Dec. 13	5½	5½	Do. 5½ p.c. Deb.	120—125	...
152,600	Feb. 21	8	9	Guildford Cons.	167—172	...
54,055	,,	5	5	Do. 5 p.c. Pref.	108—113	...
68,250	Dec. 13	5	5	Do. 5 p.c. Deb.	112—117	...
156,600	Feb. 21	7½	7½	Hampton Court Cons. ...	142—152	...
80,000	Feb. 21	4	4	Lea Bridge 4 p.c. Pref ...	94—99	...
60,000	,,	6	6	Do. 6 p.c. Pref. ...	123—128	...
94,876	Dec. 13	4	4	Do. 4 p.c. Deb. ...	97—100	...
73,620	Mar. 7	8½	8½	Luton Cons. 'A'	160—165	...
107,960	Mar. 21	4	5½	Mid Kent Ord.	8¾—9¼	...
230,940	Feb. 7	10	10	Oxford & District Ord. ...	202—207	...
47,112	,,	5	5	Do. 5 p.c. Pref.	106—111	...
50,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	108—113	...
126,193	Nov. 15	7½	7½	Peterborough Ord.	158—163	...
64,990	Mar. 7	6½	7½	Redditch Ord....	122—132	...
166,850	Feb. 7	8	8	Romford Ord....	148—153	...
60,000	,,	4	4	Do. 4 p.c. Pref.	97—100	...
44,000	Mar. 21	5	5	Do. 5 p.c. Deb.	111—116	...
25,570	Feb. 7	5½	5½	Rugby 5½ p.c. Pref.	123—128	...
25,000	,,	6	6	Do. 6 p.c. Red. Pref. ...	103—108	...
42,750	Dec. 13	5½	5½	Do. 5½ p.c. Deb.	120—125	...
10,950	Feb. 21	8	8	Ryde Ord.	140—150	...
270,086	Mar. 21	7	7	Slough Ord.	128—133	...
21,000	Dec. 13	5	5	Do. 5 p.c. Deb.	110—115	...
28,872	Nov. 1	5½	5½	S. Midland Gas Cpn. Ltd. Ord.	19/—21/-	...
28,866	Mar. 7	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	18/6—20/6	...
137,730	Feb. 21	7	7	Southgate & Dist. 7 p.c. max.	135—140	...
62,500	,,	5	5	Do. 5 p.c. Pref.	110—115	...
117,228	Feb. 7	5	7	Swindon Cons.	104—109	...
60,425	Dec. 13	5	5	Do. 5 p.c. Deb.	110—115	...
64,380	Dec. 13	5	5	Torquay and Paignton 5 p.c. Pf.	108—113	...
33,858	Nov. 15	...	-/2·70b	United Kingdom Gas Corpn. 4½ p.c. 1st Cum. Pref. ...	18/—20/-	...
130,000	Feb. 7	5	8	Wakefield Ord.	118—123	...
81,650	,,	5	5	Do. 5 p.c. max.	101—106	...
82,000	Feb. 21	6	6	Weymouth Ord.	105—110	...
98,384	Feb. 7	6	6	Wolverhampton 6 p.c. Pref....	118—123	...
160,000	Dec. 13	5½	5½	Do. 5½ p.c. Rd. Db.	107—112	...
90,000	Dec. 13	5	5	York 5 p.c. Red. Deb.... ...	104—109	...
133,640	Feb. 21	6½	6½	Yorktown (Cam.) 5 p.c. Cons.	126—131	...
120,000	,,	5	5	Do. 5 p.c. Pref.	106—111	...
35,000	Dec. 13	5½	5½	Do. 5½ p.c. Deb.	121—126	...

BRISTOL EXCHANGE

Issue.	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Apl. 14.	Rise or Fall on Week.
347,756	Feb. 7	5	6	Bath Cons.	120—122	...
1,667,250	Feb. 7	5	5	Bristol, 5 p.c. max.	114—116	...
120,420	Dec. 13	4	4	Do. 1st 4 p.c. Deb. ...	100—102	...
217,870	,,	4	4	Do. 2nd 4 p.c. Deb. ...	100—102	...
328,790	,,	5	5	Do. 5 p.c. Deb.	119—122	...
274,000	Feb. 21	5	5	Newport (Mon.) 5 p.c. max....	99—101	...
13,200	Mar. 21	7	8⅝	Pontyp'l Gas & W. 10 p.c. 'A'	12½—13½	...
13,600	,,	5	6	Do. 7 p.c. 'B'	11½—12½	...
40,000	,,	5	6	Do. 7 p.c. 'C'	11½—12½	...
140,778	Feb. 7	5	5	Weston-super-Mare Cons. ...	110—112	...
64,338	Jan. 3	4	4	Do. 4 p.c. Deb.	94½—96½	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	154—157	...

LIVERPOOL EXCHANGE

Issue.	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Apl. 14.	Rise or Fall on Week.
157,150	Feb. 7	5	6½	Chester 5 p.c. Ord.	103½—107½	...
92,500	Dec. 13	4	4	Do. 4 p.c. Pref.	96—100	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	88—91	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—101	...
2,167,410	Feb. 21	6	6	Liverpool 5 p.c. Ord.... ...	124—125	...
245,500	Dec. 13	5	5	Do. 5 p.c. Red. Pref. ...	99—104	...
306,083	Jan. 17	4	4	Do. 4 p.c. Deb. ...	100—102	...
106,280	Feb. 7	10	10	Preston 'A' 10 p.c.	202—212	...
188,219	,,	7	7	Do. 'B' 7 p.c.	144—154	...

NEWCASTLE EXCHANGE

Issue.	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Apl. 14.	Rise or Fall on Week.
122,577	Feb. 21	8	8	Blyth 5 p.c. Ord.	163½—164½	...
732,000	Feb. 21	5	5	Hartlepool G. & W. Cn. & New	110—112	...
2,061,315	Feb. 7	5	5⅝	Newcastle & Gateshead Con.	22/9—23/3a	...
682,856	,,	4	4	Do. 4 p.c. Pref. ...	98—100	...
776,706	Jan. 3	3½	3½	Do. 3½ p.c. Deb. ...	91½—92½	...
277,285	Nov. 1	5	5	Do. 5 p.c. Deb. '43...	103—105	...
332,351	Feb. 7	6	6	Sunderland 6 p.c. max. ...	137—139	...

NOTTINGHAM EXCHANGE

Issue.	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Apl. 14.	Rise or Fall on Week.
542,270	Feb. 21	6	9	Derby Con.	135—145	...
55,000	Dec. 13	4	4	Do. 4 p.c. Deb.	100—105	...
20,000	Dec. 13	5	5	Long Eaton 5 p.c. Pref. ...	10—12	...
80,000	,,	5	5	Do. 5 p.c. Deb. ...	105—110	...

SHEFFIELD EXCHANGE

Issue.	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, Apl. 14.	Rise or Fall on Week.
10,000	Feb. 21	10	10	Great Grimsby 'A' Ord. ...	205—215	...
6,500	,,	10	10	Do. 'B' Ord. ...	205—215	...
79,000	,,	10	10	Do. 'C' Ord. ...	195—205	...
1,806,339	Feb. 21	6½	6½	Sheffield Cons.	139—142	...
95,000	Jan. 3	4	4	Do. 4 p.c. Deb.	100—103	...

a The quotation is per £1 of Stock. *b* Actual. * Ex div.

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